News Briefs

JILL MINNER, Special Projects Editor

FERC approves new service schedule for MAPP transactions

A new service schedule for Mid-Continent Area Power Pool (MAPP) transactions has been approved by the Federal Energy Regulatory Commission. MAPP says the new schedule will allow member companies to "shop in the market" for lower priced energy than may be available under present pool rates.

Under the new rate, called Schedule M-General Purpose Energy, members will be able to negotiate prices for energy sales to other members up to a formula-based maximum rate. Terms of the sale, including duration and delivery schedule, are also negotiable, according to MAPP.

FERC has also approved changing four other MAPP service schedules from a fixed demand rate to a ceiling rate based on a formula. This will allow buyers and sellers to negotiate a demand charge up to the ceiling rate, says MAPP.

MAPP, the North American Electric Reliability Council region, includes parts of Wisconsin, Minnesota, Iowa, Nebraska, North Dakota, South Dakota, Montana, Illinois and Michigan and the Canadian provinces of Manitoba and Saskatchewan.

Coalition to support natural gas imports

The Coalition for Diversified Gas Supplies has been formed by 40 natural gas distributors, interstate pipelines and electric utilities, in response to recent legislation in the U.S. Senate to impose additional restraints on Canadian natural gas imports.

"Canadian natural gas is an important source of energy for millions of Americans. Erecting barriers to this supply via anti-competitive legislation is threatening to the American economy and unfair to American consumers," stated Coalition Chairman Robert B. Catell, president and chief executive officer of the Brooklyn Union Gas Co.

According to the coalition, the natural gas portion of S.1220, a major energy bill that left the Senate Energy Committee last month, would put regulatory hurdles in place for imported gas under the premise that rate design differences discriminate against domestic suppliers. "This premise is false," said Catell, "as has been clarified in numerous regulatory proceedings and is demonstrated by the continued success of domestic gas in competition with Canadian supplies in the United States. This bill is an attempt to shield domestic producers from competition, at the expense of U.S. gas consumers, but domestic producers do not need this protection. Natural gas from domestic sources currently makes up the bulk of natural gas volumes purchased by coalition members, and will continue to do so."

Coalition members from the electric utility industry include: Central Hudson Gas & Electric Corp., Consolidated Edison Co. of New York Inc., Consumers Power Co., Edison Electric Institute, Fitchburg Gas and Electric Light Co., Long Island Lighting Co., New England Electric System, New York Power Authority, New York State Electric and Gas Corp., Ocean State Power Co., Pacific Gas & Electric Co., Public Service Electric and Gas Co., San Diego Gas & Electric Co., and Southern California Edison.

The coalition will "provide information to dispel the myths that supporters of the amendment seek to promote. We will advocate the right of distributors and pipeline companies to employ Canadian gas as an option for building diversified, reliable, cost-effective portfolios to meet the needs and expectations of their customers," explained Catell.

PTI forms new unit

Power Technologies Inc. and Nybro-Bjerck of Asker, Norway, have formed a jointly owned company, Hydropower Technologies Inc., according to PTI.

The new company, located in Schenectady, NY, will offer hydromechanical engineering consulting and software services for planning, design, and operation of hydroelectric facilities. Areas covered include: plant performance, conceptual design studies, unit load coordination, plant upgrading, plant and unit optimization, maintenance planning, education and training, and electrical and specialized hydromechanical technologies.

Michigan regulatory incentives study results released by NARUC

The National Association of Regulatory Utility Commissioners has released Phase I of its three-phase review of the Michigan Public Service Commission's regulatory system and its effects on resource selection by electric utilities that the PSC regulates. The report on the Michigan Regulatory Incentives Study was conducted by Barakat & Chamberlin, with financial support from NARUC, the Michigan PSC, Detroit Edison Co. and Consumers Power Co.

According to the report, Michigan is one of many states that does not have any policies or mechanisms to offset the DSM-induced loss of base revenue between rate cases. Consumers Power Co. does, however, have a performance-based DSM incentive mechanism for its energy conservation program. Under the program, the company collects a bonus for each kilowatthour saved above target levels. Although the incentive mechanism does not make conservation profitable, it shows that the commission is willing to link earnings to DSM performance, according to the report.

NARUC's report also analyzed three financial incentives: capitalization of DSM expenses; an electric revenue adjustment mechanism (ERAM); and shared benefits or shared savings. The report found that ERAM in Michigan would require major regulatory changes and may meet with significant public opposition.

Phase II of the study will involve Consumers Power and Detroit Edison conducting independent assessments of the three options in the first phase, according to NARUC.

Copies of the 128-page report are available for $15 from NARUC, P.O. Box 684, Washington, DC, 20044.

Alliance reacts to WEPCo ruling with 'cautious optimism'

The Alliance for Acid Rain Control and Energy Policy expressed "cautious optimism" in reaction to EPA's proposed regulation exempting most pollution-control modifications to existing electric utility power plants from new source review, according to Wyoming Gov. Mike Sullivan, co-chairman of the alliance (see *EL&P*, p.1, 7/91).

"If the EPA makes this proposal final, it will resolve many questions that utilities have voiced about how to operate under the new acid rain law. More importantly, it will mean that utilities can choose the least costly and most environmentally desirable technologies to comply with the law," Sullivan noted.

"We're really dealing with two distinct issues here. It has been the Alliance's position that forcing the use of scrubbers in controlling sulfur dioxide emissions makes neither environmental nor economic sense because there already exists a national cap on sulfur-dioxide emissions," he continued. "We applaud the EPA for realizing that requiring new-source review for plant modifications for SO_2 emissions has no adverse environmental impact."

"Unfortunately, the ruling goes too far in that it exempts plants from new source review for NOx and particulate emissions for which an emissions cap does not exist. This could slow environmental progress in reducing emissions of these pollutants. Had the ruling been limited to sulfur dioxide only, we would have been happier, but on balance this ruling means progress," Sullivan concluded.

According to Wisconsin Governor and Alliance Co-Chairman Tommy Thompson, "This decision clears the way for utilities to switch over to environmentally sound low-sulfur coals without having to face a costly review process by the EPA. Requiring the use of scrubbers or other SO_2 reducing technologies whenever a plant wants to modernize would translate into increased electric rates for consumers while providing no real environmental benefits."

Scientific Columbus changes name

Scientific Columbus Inc. recently announced that it has changed its name to Jemtec Electronics Co., to more clearly communicate the nature of its business. The company said the new name will be phased in over the next several months.

Utilities fined by NRC

The U.S. Nuclear Regulatory Commission recently proposed the following fines:

Carolina Power & Light
A $87,500 fine for three violations of NRC requirements at the Brunswick Steam Electric Plant. NRC Regional Administrator Stewart D. Ebneter said the violations "represent a continuing human performance problem that is of serious concern to the NRC."(see *EL&P* 6/91, p.2)

Gulf States Utilities Co.
A $37,500 fine for alleged violation of NRC requirements at the River Bend Station. The utility was cited for not maintaining barriers to a high radiation area and for an incident of improper worker practices.

Tennessee Valley Authority
A $75,000 civil penalty for alleged violation of NRC requirements at the Sequoyah nuclear power plant. The violation involved an air-start accumulator on an emergency diesel generator that was depressurized to a low level and that plant operators had not responded to an alarm indicator in the control room alerting them to the problem. The NRC said the condition existed for up to two hours before any action was taken.

Yankee Atomic Electric
A $50,000 fine for alleged violations that were found after one of the emergency diesel generators failed to start during a routing surveillance test at the Yankee Nuclear Power Station.

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COMMENTARY

Electricity offers 'solutions'

Over the past few years electricity has been accused of being a prime contributor to acid rain, global warming (if there is such a thing), destruction of the ozone layer, and air pollution in general. So it is with some real interest that we reviewed Mark Mills research report on *Ecowatts* (p.9). Mills' analysis of manufacturing and business operations revealed a number of areas where electrical usage not only was "as good" as other energy sources but was environmentally superior. Restricting his analysis to CO_2, Mills reported that while U.S. Gross National Product has surged more than 50 percent since 1973, emission of CO_2 has increased only 7 percent. CO_2 emission has fallen from four pounds per dollar of GNP in 1973 to 2.34 pounds per dollar in 1990.

Mills argues that while reducing wasteful, inefficient use of electricity only makes good sense, blind pursuit of ever-lower kWh-use may be environmentally counter-productive. In this, he disagrees strenuously with Amory Lovins, leading proponent of the less-is-best *Negawatt* philosophy.

Enough arguing. Let's assemble the proponents of the many diverse philosophies affecting energy-use and charge them to come up with a single, non-adversarial policy by which energy plans can be evaluated for economic and environmental optimization—an energy/environmental summit meeting. It seems to work in international politics; why not for domestic energy use?

Gas up Shoreham, Rancho Seco?

Two of the nation's nuclear plants—Shoreham, built but never operated by Long Island Lighting Co., and Rancho Seco, owned but no longer operated by the Sacramento Municipal Utility District—have been mentioned recently as prospects for changeover to gas-firing. Odds on the two developments occurring are about 7-3 *for* Shoreham, but 9-1 *against* Rancho Seco conversion.

Shoreham is about to be acquired by the Long Island Power Authority (LIPA), a 2-year-old state-owned entity created to purchase the nuclear plant and to furnish substitute power to LILCo. LIPA says a recent study showed that an investment of about $215 million to convert Shoreham to run on natural gas would save ratepayers about $80 million through 2013, compared with LILCo's resource plan. In other words, according to LIPA, an additional investment amounting to something less than 4 percent of current investment in the NRC-approved concrete and steel monument could turn it into 413 MW of useful capacity to provide electricity to LILCo's customers.

If engineering and bidding back up the projections, customers who will pay Shoreham's cost anyway, may get something good in return. For LILCo customers, the choice is between accepting Shoreham costs in guaranteed higher rates and having a questionable power supply, or absorbing Shoreham costs, paying higher rates *and* gaining an abundant supply of electricity. (Preservation as a nuclear plant remained a long-shot option as of July 24.)

For Rancho Seco, it's a totally different situation. SMUD General Manager David S. Freeman calls the plant "dead," with no chance for return to operation on gas or anything else. Freeman's position is based on his desire to avoid massive investment or reliance on any single energy resource. Repowered to burn natural gas, Rancho Seco's 660-MW capacity would represent about a third of SMUD's total capacity...too much to maintain system reliability, Freeman says. And with the prospect of natural gas prices rising rapidly after 2000, he believes his plan for a diversified base of renewable and NUG power provide a better chance of ensuring a satisfactory power supply and holding rates down. But SMUD customers still will be saddled with nuclear debt...and nothing to show for it, which seems to be questionable economics at best.

Consumer advocate will be missed

The industry has lost a long-time supporter of public power. Vic Reinemer died last month. A long-time assistant to Sen. Lee Metcalf (D-MT), and Editor and Publisher of *Public Power*, Vic believed deeply in the benefits of public power. We debated the values of a pluralistic electric system and the financial performances of major investor-owned electric utilities many times before his 1988 retirement. Things haven't been quite so lively since. He'll be missed.

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1250 S. Grove Ave., Barrington, IL 60010

Arthur L. Rice, Publisher
Robert A. Lincicome Editor-in-Chief

PennWell PUBLISHING COMPANY
708-382-2450
Fax: 708-382-2977

Henry Stein, Senior Editor-Generation
H. Wayne Beaty, Senior Editor-Transmission/Distribution
Mark T. Hoske, News Editor
Jill F. Minner, Special Projects Editor
Dianne Wilson, Editorial Assistant-Products/Literature
B. J. Davidson, Bulletin Board Coordinator
William Kenworthy, Legal/Regulatory Editor
Ted Pollock, Management Editor
Richard D. Alaniz, Labor Management Editor
Anthony F. Cantarella, Safety/Training Editor
John D. Turrel, Contributing Editor

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LETTERS

Greenhouse gas and lighting

We are quite concerned about the message the [Phillips Lighting] ad portrays (*EL&P*, p.5, 5/91).

To quote the text of the ad, "This in turn eliminates over 1500 pounds of greenhouse gas emissions that contribute to the global warming problem." While we have no quarrel with Phillips Lighting marketing their light bulb, we would prefer that they not market it under the assumption that global warming is occurring and that coal-produced gases are causing the earth to warm. Utilities such as Minnkota, who [sic] are nearly 100-percent coal-based generation utilities, have a strong concern over the economic consequences of such an assumption.

I believe that if you talk to credible scientists who have spent a significant amount of time researching this issue, they would tell you that the assumption that global warming is occurring is suspect. Also lacking any credible evidence is the idea that carbon dioxide has caused or will cause the earth to warm.

Because your magazine banner indicates you are "The voice of the electric utility industry," I would encourage you to be more selective on ad placements in your magazine. This ad, I believe, does not represent the electric utility views on the issue.

David W. Loer
General Manager
Minnkota Power Cooperative, Inc.

Editor's note: While we screen advertisements for violations of legal and moral principles, we are duty bound to publish the message of any utility, supplier, organization or group that passes that review. As we would not be censored, we will not censor others unless we determine their message to be libelous, illegal or immoral. We may not agree with or endorse an advertiser's message, in whole or in part, but except for those moral/legal violations, we will defend anyone's right to an opinion or view, and the right to express it. We continue to publish the debate on both sides of the global-warming theory.

Appliance recycling

I'm concerned that the article in your March issue describing Northeast Utilities' appliance recycling program may have left a false impression with your readers regarding the origins of the program.

Wisconsin Electric Power Co. in 1987 designed to its own specifications the first large-scale appliance turn-in program in the country. Your article implies that Appliance Recycling Centers of American (ARCA) developed this program for Wisconsin Electric. That is incorrect.

Appliances are removed from customers' homes by independent trucking firms that include non-profit and community agencies. ARCA removes the chlorofluorocarbons and transports the white goods to a scrap shredder. ARCA also removes the capacitors, which may or may not contain PCBs. The capacitors are placed in containers, which Wisconsin Electric then transports to an EPA approved site where they are incinerated according to EPA standards.

In January, Wisconsin Electric received the National Wildlife Federation Environmental Achievemenent award for recycling nearly 200,000 old, inefficient refrigerators, freezers and room air conditioners through our Appliance Turn-in Service.

I hope this information clarifies the origins of our progam for your readers.
Robert Link, Asst. VP-Marketing
Wisconsin Electric Power Co.
Milwaukee, WI

Editor's note: Sorry if we inadvertantly confused the issue of who launched the first appliance turn-in program. Congratulations to Wisconsin Electric for their achievements.

New substations expand operating flexibility at WEPCo

PHILADELPHIA—United Engineers & Constructors International (UE&C) will provide engineering and construction services for the $10.4-million substation expansion and upgrade program of Wisconsin Electric Power Co. Goal of the program is to improve operating flexibility in WEPCo's upper Michigan service area.

UE&C was awarded the contract from ABB Power T&D Co., the prime contractor for the project, to engineer and construct two new 345-kV substations on the upper Michigan peninsula, plus modifications to a 138-kV substation.

ABB Power T&D will provide electrical equipment, relay engineering and project management. One of the new substations will be near WEPCo's generating station at Presque Isle, MI, and the other at the site of an existing substation about 90 miles south at Quinnesec. Modifications will be made at the Presque Isle Power Plant switchyard.

Southern Co. to install advanced EMS

MELBOURNE, FL—Harris Corp. was awarded a $35.5-million contract from Southern Company Services for an energy management network. Headquartered in Birmingham, AL, SCS provides technical and specialized services to Alabama Power, Georgia Power, Gulf Power, Savannah Electric and Power, Southern Nuclear Operating Co., Southern Electric International, and The Southern Investment Group.

The energy management network will provide primary control and coordinate power production and transmission activities, support the evaluation and scheduling of power exchanges between neighboring utilities, and provide online security. It will have a disaster recovery capability to provide backup from a failed system to a designated recovery system.

ENSR offers 10-yr warranty on cleaned-up transformers

CANTON, OH—ENSR Operations, a supplier of PCB services, now guarantees that its System 50 reclassification technology on serviced transformers will not fail for a period of 10 years. If failure does occur, a pro-rata refund of the service cost is made.

More details are available from ENSR Operations PCB Hotline, 216/430-4543.

Higher electrical use can cut greenhouse gas releases

SAN DIEGO—Increasing use of electricity could reduce adverse environmental effects, not increase them, according to a Maryland consultant. He talked with members of the press during the Edison Electric Institute's Annual Convention here in June.

Moreover, said Mark Mills, Science Concepts Inc., in addition to reducing environmental degradation, overall efficiency of energy use is improved by replacing inefficient energy applications with electrical energy at point of use.

For example, he declared that sending a 20-page fax transmission coast-to-coast results in a 95-plus percent improvement in energy efficiency compared with overnight-express delivery, and eliminates two pounds of CO_2 discharge into the atmosphere as well.

Arguments that *reducing* electrical use will improve the environment are wrong, Mills explained. These arguments, he said, presume that since electric utilities consume the most fuel of any industry—36 percent, to make electricity—reducing kWh use will reduce fuel use...especially coal and oil ...and result in a cleaner environment.

The premise is simply wrong, he argued. Since 1973, the U.S. Gross National Product has grown more than 50 percent, while emission of CO_2 has increased only 7 percent. In other words, he suggested, if global warming is fact, then the U.S. economy's contribution to warming actually has *declined* by one measure, from four pounds of CO_2 per dollar of GNP in 1973 to 2.34 pounds per dollar of GNP in 1990.

"And it came at a time when nearly two-thirds of the economic growth was fueled by a 380-million-ton increase in coal consumption," Mills said.

This overall improvement is the result of using Ecowatts—the result of what happens when electricity displaces fuels, supports economic growth and improves the environment. He admitted disagreement with Amory Lovins, leading proponent of pursuing the *Negawatt*, the overall reduction of electrical use resulting from more efficient applications.

Mills suggests that following the Ecowatt path can help reduce global warming. For example, for each pound of steel produced electrically, two pounds of CO_2 are eliminated. Similar reductions in CO_2 production result when the ink on 40 magazine pages is dried with electrically powered ultraviolet heat, instead of a gas flame; a typical home is heated with a heat pump for two hours; an electric car is driven nine miles. These savings, he says, include the fuels used to make the electricity.

Other functions producing two-pound CO_2 savings include the following (total energy savings is given in parentheses): mowing a lawn for two hours with an electric mower instead of one powered with gasoline (30 percent); cooking a two-pound meatloaf in a microwave instead of a gas oven (90 percent); dry the paint on one new car with UV instead of gas heat (90 percent); securing one pound of toxic waste by electric vitrification instead of transporting/digging/burying (20 percent) and make 12 glass bottles in an electric furnace instead of a fuel furnace.

Many hundreds of new technologies that can further reduce adverse environmental effects and improve overall energy efficiency currently are under development. These include acoustic refrigeration, halogen cooking stoves, light-rail transportation, smart windows, electron-beam welding, membrane filtration, acoustic mufflers, to name but a few, he explained.

Mills admitted that programs aimed at improving electric efficiency cost effectively, without adverse economic and social side-effects, have their place today. But he argues that preoccupation with *saving* electricity has blinded many planners and business/political leaders to what substitution of electricity for other fuels at the point of use can really do.

Moreover, he pointed out, a large part of the potential for demand-side management/negawatt programs either is theoretically feasible, but is not economic or appears to be feasible, but no plans for implementation have been made. Between 1990 and 2000, he said, of 220 GW of potential DSM resources technically available, only 25 GW appear likely to occur.

Corrections and amplifications

Several errors appeared in the Top 100 Electric Utilities report (*EL&P*, 6/91, pp. 21-24):

On page 21, the Earnings-Per-Share ranking of Florida Progress Corp. erroneously duplicated that of FP&L Group, its neighbor to the South. Florida Progress Corp. actually provided 1990 per-share earnings of $3.21, a decrease of 12.53 percent from 1989's $3.67 and should have ranked 70th on our list, not 98th as published.

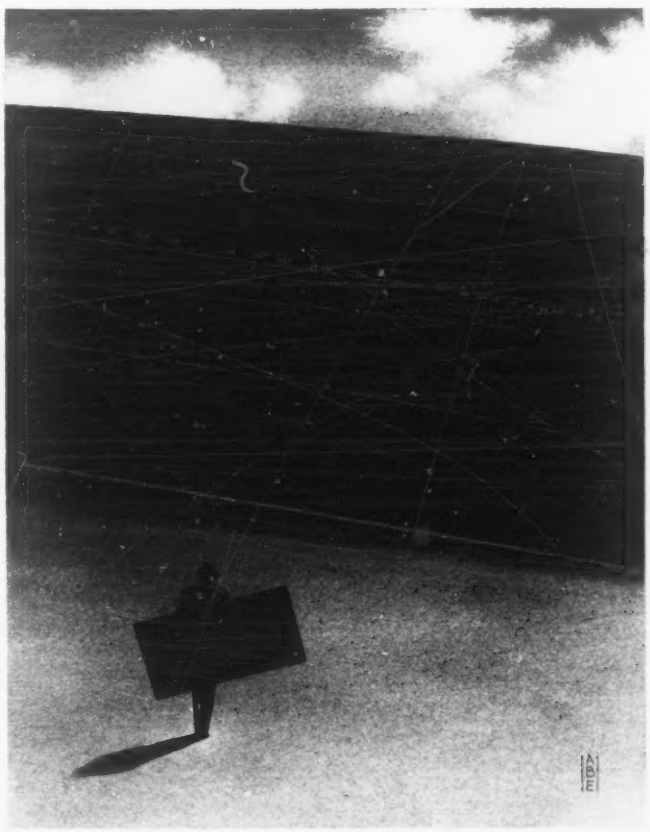
Also, Florida Progress' Net Income for 1990 was $164.8 million, not $64.8 million as printed (p.24 table).

In the text about kWh sales growth (p.22), Cincinnati Gas & Electric's 15.2 percent increase resulted in total sales of 22,006-million kWh, not 13,600-million kWh.

Several listings of Wisconsin Public Service Co. were in error (pp.23, 24).

Somehow, some of the percentages of revenues from electric operations, generally those from New England Electric System and below on the alphabetical listing were off by a factor of 10.

A typographical error grossly exaggerated the capital cost of PSI Energy's compliance to the Clean Air Act Amendments of 1990 (*EL&P*, 7-91, p.12). The company said it would spend about $1.6 billion to comply, on $1.7 billion in present plant value.



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Investor-owned 1st-quarter financing falls

ATLANTA—Investor-owned electric utility financing fell 14 percent in the first quarter of 1991, compared to the same period in 1990, said Ebasco Services Inc.

"Refundings" totaled $300 million, down from 975 million. New money financings increased 28 percent to $1.4 billion (see table).

Common stock issues increased significantly from $34.1 million to $531.2 million. The amount of long-term debt issued decreased about 45 percent.

For comparison, the financing for alternative energy projects was $455 million for cogeneration, but zero for wind and independent power, said Ebasco's "Analysis of Public Utility Financing."

Offerings of Securities by Investor-Owned Utilities ($000)

Long Term debt	1,089,426	62	1,996,000	94	-45
Preferred Stock	145,000	8	75,000	4	93
Common Stock	531,188	30	34,125	2	1457
Total Financing	1,764,613	100	2,095,125	100	-16
Public	1,589,613	90	2,095,125	100	-24
Private	175,000	10	0	0	-
New money	1,434,613	81	1,120,125	53	28
Refunding	330,000	19	975,000	47	66
Competitive	375,000	21	550,000	26	-32
Negotiated	1,214,613	69	1,545,125	74	-21
Private	175,000	10	0	0	-

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The New Face Of Coal.

CONSOL Consolidation Coal Company

Inquire R.S. 37

Surge protection market expands

NORTHPORT, NY—The 1991 edition of *U.S. Electrical & Electronic Surge Protection Markets* is expected to be completed this month. The first edition, published in 1989, included chapters on the markets for plugin, hardwired, utility, datacom, telecom and RF/microwave surge protectors.

For additional information contact Dennis Zogbi, World Information Technologies Inc., 24 Woodbine Ave., Northport, NY 11768; Ph. 516/754-5700, fax 516/754-5746.

from page 12

Employment cases...

made arbitration an even more attractive alternative. The Supreme Court ruled that an agreement to arbitrate employment disputes was enforceable even if the dispute was one which the employee could have otherwise presented to a jury. The *Gilmer* decision involved age discrimination, and due to its unusual facts, must be carefully reviewed by an employer considering entering into contracts requiring arbitration with its employees. But such contracts, if carefully drafted, will probably be binding.

Less expensive in time and money

In addition to avoiding the possible runaway jury, the arbitration forum is much less expensive, both in time and money, than court litigation. Arbitration virtually does away with the extensive pretrial discovery process inherent in litigation. Moreover, since arbitration applies evidentiary rules on a much more informal basis, many of the issues of contention in formal litigation do not arise.

Thus, unlike court litigation, an employer does not sustain substantial losses (attorney fees and court costs), even in cases he wins.

Arbitration also has its benefits for the employee. An employee who truly feels he has been unjustly treated by his employer may seek prompt corrective relief. Arbitration awards usually take but a few months. Court litigation is almost always a matter of years.

Costs for the employee are less. Although big verdict-seeking plaintiff attorneys may shy away from a simple arbitration case, an employee pursuing his dispute in arbitration usually will find it much easier retaining an attorney for the limited time the case takes. Also, as a group, arbitrators are usually sympathetic to an employee's claims.

Employers who once criticized the arbitration system should take a new look from today's perspective and consider the matter again. Although arbitration may not be the perfect way to resolve employment disputes, given the alternatives, many employers are finding it the best choice available.

from page 13

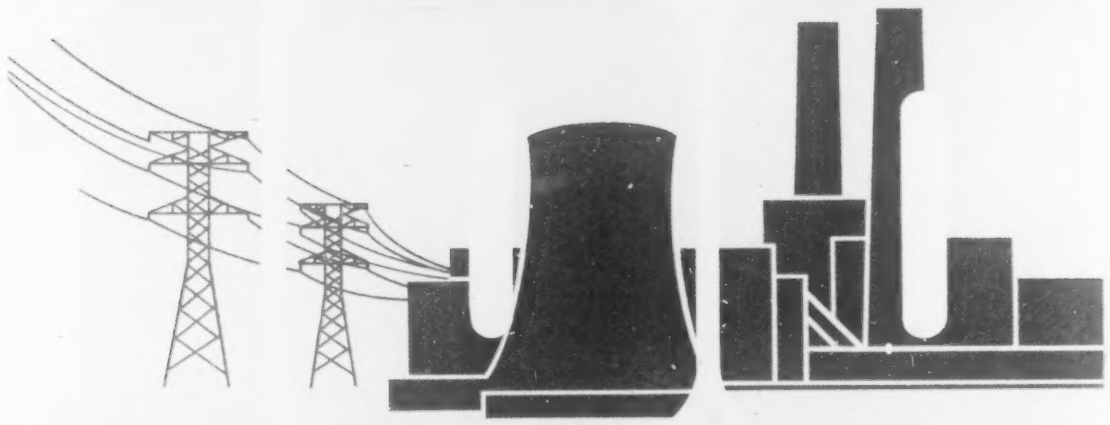
Selling efficiency...

more?" Quirk named just two:

Some environmentalists have criticized Con Ed's lavish "Enlightened Energy" prospectus, more than 38,000 of which had been distributed by early March. It is printed in full color on heavy, coated paperstock. The environmentalists may have overlooked "Printed on recycled paper" on the back cover.

The other static has come from an organization of large users—commercial and industrial accounts that call their group Multiple Intervenors. Their gripe is that, the way they read the plan, they'll have to bear a disproportionate share of the program's cost. That argument has yet to be resolved.

THE TOP 100 ELECTRIC UTILITIES



1990 OPERATING PERFORMANCES

Capacity margins, fuel use fall; heat rates inch up

Henry Stein
Senior Editor—Generation

The median heat rate for utilities reporting to EL&P's Top 100 Electric Utilities performance survey edged up slightly in 1990 from 1989, increasing for the second time in three years after seven years of steady declines ('82-'88).

The small changes from 1988 through 1990 suggest only that the overall downward trend in heat rates has bottomed out. The median heat rate for the reporting Top 100 was 10,601 Btu/kWh in 1990, which was slightly higher than 1939's median of 10,561 Btu/kWh. But this is a less than 1-percent change (as was the rise in average heat rate).

Importantly, Top 100 utilities used less fossil fuel in 1990 than in 1989, even though their kilowatthour sales rose by 2 percent (EL&P, June, p.21). At the same time, capacity margins continued to decline.

Fossil-fuel use by those responding to the EL&P survey was down in all three major categories (Table 1), or by approximately 1 percent for coal, a whopping 30 percent for oil and a large 25 percent for natural gas. Yet total electrical output was up 1.6 percent for the year, according to Edison Electric Institute figures, which suggests greater reliance on non-utility generators.

Figure 1. Total U.S. Electric Capacity Margins (excluding Alaska & Hawaii)

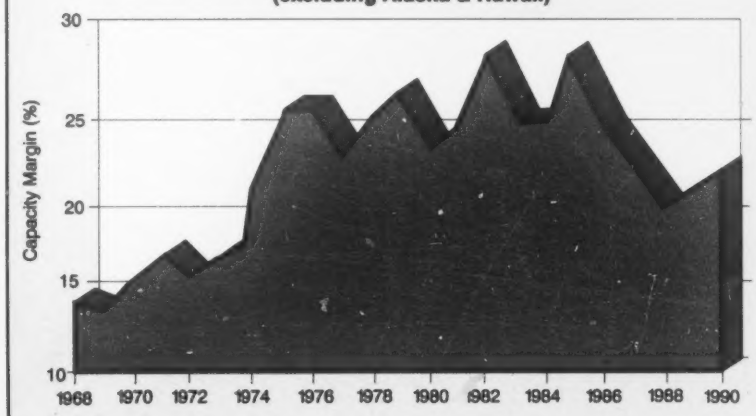
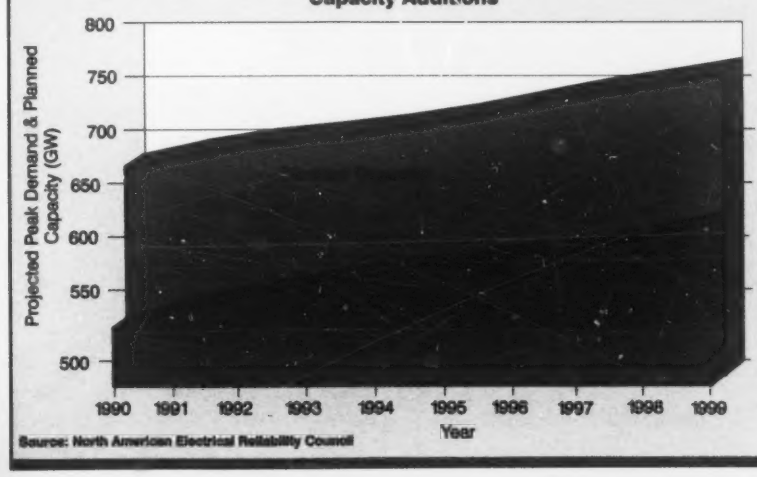


Figure 2. Forecast Summer Peak Demands vs. Planned Generating Capacity Additions



Top 100 overall

The fuel reductions reversed an '88-'89 increase in consumptions of all three types. Specifically, the changes in last year's report indicated that the coal burned in '89 was nearly 9 percent more than in '88, oil burned increased by almost 30 percent and natural gas by almost 21 percent.

The drop in oil consumption in 1990 was undoubtedly due to efforts by all electric utilities to reduce their dependence, no matter how small, on unreliable prices and supplies of what was formerly known as "liquid gold."

However, the consumption trends reported to *EL&P* for the three main electric utility fossil fuels are backed up by data from the Edison Electric Institute's advance statistics for 1990. EEI reported that although electric utility generation increased in 1990, a smaller percentage of the total came from coal, oil and natural gas. Coal's share dropped from 55.8 percent of total generation in 1989 to 55.5 percent in 1990, oil's from 5.7 percent to 4.2 percent, and gas's from 9.5 to 9.4 percent.

Nuclear and hydroelectric plants made up the difference in total electrical output. Nuclear power's share of generation climbed from 19.0 percent of the total to 20.6 percent and hydro's from 9.5 to 10.0 percent (in spite of the drought affecting parts of the country last year).

Margins

Still worrisome is the continuing downward trend in reserve margins by the Top 100 (Table 2). Their average reserve margin dropped again, from about 19 percent in '89 to 18 percent in '90, while the Top 100's average reserve margin for their own plants also decreased from over 12 percent down to just under 10 percent.

EEI's figures back this trend, showing an increase in total industry capacity margin in '89, which *EL&P* also reported in last year's Top 100 report (Figure 1). EEI's 1990 figures are expected to confirm the results of EL&P's study.

Meanwhile, the North American Electric Reliability Council's projections for 1990 through 1999 indicate the gradually narrowing gap between capacity and peak demand (Figure 2), from approximately 138 GW in '90 to about 120 GW in '99.

NERC calculated that summer capacity margins would fall from 22 percent in 1990 to a still comfortable 17.8 percent in 1999.

The Council went into more details in its *1991 Summer Assessment*, which presented and evaluated information for the U.S. as a whole, and for the 10 NERC regions, which include Canada and a small part of Mexico. The report assessed bulk electric supply conditions for June through September.

Peak demand in 1991 was projected to be 1.8 percent higher in the U.S. than last summer and 1.7 percent higher in Canada. But generating capacity was thought to be adequate, barring extreme weather or greater-than-expected outages.

NERC warned that power supplies may be inadequate for some subregions of the Southeastern Electric Reliability Council (SERC) and Mid-America Interconnected Network (MAIN), where capacity margins are lower than normally planned.

In addition, low reservoir levels could reduce hydro capability in the Fresno, CA, area. Utilities in the area implemented special operating procedures to maintain transmission loading into the area below emergency loading levels and to avoid voltage collapse in case of a transmission outage.

Utilities in the East Central Area Reliability Coordination Agreement (ECAR) expect that acid-rain compliance legislation will impact about 50 GW of capacity, reducing generation availability and indirectly hurting capacity through emission caps.

The U.S. has adequate baseload capacity today, but needs peaking and intermediate capacity, according to a Burns & McDonell Engineering Co. study presented at the American Public Power Association's 1991 Engineering & Operations Workshop.

Capacity additions currently contemplated are mainly gas/oil-fueld and will come from non-utility sources, the study said. Most of those planned are gas-fired, simple-cycle turbine units.

Burns & McDonnell forecasts that fossil-fueled, mainly pulverized-coal, steam units will supply baseload requirements, supplemented by fluidized-bed combustion plants burning refuse and low-quality coal. The company also predicted renewable resources would play a larger role in electricity production within this decade, but still would provide only a small percentage of total requirements.

As one example of where the electricity supply situation seems to be heading in many areas, Bonneville Power Administration said it might need another 750 MW by the year 2000, if demand continued to grow at the present pace in its area. Yet BPA's 750 MW is only about one-third of what the *1991 Northwest Conservation and Electric Power Plan* from the Northwest Power

Company	Rank	Heat Rate (Btu/kWh)	Up or Down	Coal (1000 tons)	Oil (1000 bbl)	Gas (1000 MCF)	Percent Change In Coal	Oil	Gas
Commonwealth Energy System*	1	9,616	U	0	6,663	1,566	0	-17	-41
American Electric Power*	2	9,777	D	46,205	541	0	3	-4	0
Cincinnati Gas & Electric	3	9,804	D	9,007	104	140	5	-16	-5
DPL*	4	9,881	D	5,616	37	306	-1	118	258
United Illuminating	5	9,921	U	958	4,863	2,737	12	-20	28
New York State Electric & Gas	6	9,936	D	6,395	18	0	-1	-28	0
Detroit Edison	7	9,940	-	18,891	312	18,146	3	-74	13
Allegheny Power System*	8	9,944	D	16,340	0	0	-4	0	0
Southwestern Public Service	9	9,974	U	8,266	8	40,377	1	-72	10
Potomac Electric Power	10	9,983	D	6,954	3,321	8,956	0	-48	-20
Florida Progress* (FPC)	11	10,005	D	5,781	10,245	3,654	3	-21	-32
Duke Power	12	10,009	D	10,217	162	831	4	-8	137
CMS Energy*	13	10,019	D	6,085	859	0	-7	-20	-100
Southern Company*	14	10,030	D	44,671	433	17,340	3	80	7
Public Service of Indiana	15	10,063	D	12,000	16	0	4	NA	0
New England Electric*	16	10,106	U	3,369	7,517	5,481	-5	-13	155
TECO Energy*	17	10,107	D	6,371	226	0	-6	82	0
Green Mountain Power	18	10,161	U	18	51	514	-39	-58	13
Cilcorp*	19	10,173	U	2,248	0	22	4	0	16
Central Hudson Gas & Electric	20	10,209	U	818	3,404	6,239	-6	-33	30
Union Electric	21	10,238	U	10,661	20	588	-1	-44	51
Pennsylvania Power & Light	22	10,249	D	10,802	2,634	0	-3	-60	0
Boston Edison	23	10,340	U	0	6,388	42,805	0	-31	16
Dominion Resources*	24	10,344	U	9,283	1,802	6,268	-16	-73	68
Centerior Energy*	25	10,351	D	8,569	227	20	5	-64	18
Idaho Power	26	10,368	U	3,199	1	0	2	-75	0
SCANA Corporation* (SCE&G)	27	10,375	U	4,207	6	6,150	-7	-71	196
Gulf States Utilities	28	10,416	D	1,951	22	175,534	0	10	8
Southern California Edison	29	10,417	U	5,318	3,182	140,250	4	-41	-24
Louisville Gas & Electric	30	10,431	D	4,881	0	44	9	0	-57
General Public Utilities*	31	10,446	U	7,552	1,170	10,875	-3	-54	-34
Kentucky Utilities	32	10,451	U	5,615	6	0	2	200	0
Central & South West*	33	10,456	D	16,980	178	206,458	5	-50	-5
IPALCO Enterprises*	34	10,474	U	5,727	90	0	3	84	0
Orange & Rockland Utilities	35	10,486	U	667	1,411	14,436	13	-34	12
Niagara Mohawk Power	36	10,510	U	3,420	11,555	22,560	-2	11	-19
FPL Group* (FP&L)	37	10,512	D	729	26,183	112,565	12	1	-14
Carolina Power & Light	38	10,514	U	7,963	203	306	-18	20	-6
Wisconsin Power & Light	39	10,519	U	4,079	17	219	14	-15	-5
Consolidated Edison	40	10,522	D	0	19,415	119,046	0	-33	30
PacifiCorp	41	10,535	U	23,062	88	1,049	3	-17	69
Oklahoma Gas & Electric	42	10,537	D	6,947	68	86,058	9	134	-8
Illinois Power	43	10,557	U	6,128	187	1,125	-6	-3	44
Midwest Resources*	44	10,575	U	5,818	22	1,259	132	-89	342
Pinnacle West Capital*	45	10,585	D	7,238	58	7,096	1	5	-64
Ohio Edison	46	10,590	D	10,820	24	31	-7	-24	0
Houston Industries*	47	10,601	U	16,378	204	250,569	-6	-56	4
Iowa Southern*	48	10,609	U	1,612	13	9	8	116	0
Rochester Gas & Electric	49	10,614	D	751	909	330	-9	10	-57
Bangor Hydro-Electric Company	50	10,622	-	0	281	0	NA	NA	NA
Portland General*	51	10,623	-	1,900	47	7,445	12	-37	-42
Public Service of Colorado	52	10,625	D	7,311	29	2,195	6	-42	-48
Northern States Power	53	10,632	D	11,775[3]	61	1,769	1	-26	21
Northern Indiana Public Service	54	10,651	U	6,547	0	5,987	-1	0	67
El Paso Electric	55	10,664	D	423	1	24,152	6	-96	-22
Tucson Electric Power	56	10,667	D	3,169	0	902	31	-100	-50
Utilicorp United	57	10,685	D	1,560	19	214	5	-88	143
Hawaiian Electric*	58	10,692	U	0	13,311	0	0	1	0
Central Louisiana Electric	59	10,696	U	2,202	0	27	6	-100	-8
Delmarva Power & Light	60	10,701	NA	2,381	1,966	5,310	-5	-53	-9
Kansas City Power & Light	61	10,729	U	6,290	37	111	10	-38	-43
Wisconsin Public Service	62	10,748	D	3,678	15	501	6	-17	-30
Baltimore Gas & Electric	63	10,755	U	4,507	4,072	8,475	-5	-28	8
Central Illinois Public Service	64	10,768	U	4,708	17	0	2	-11	0
Atlantic Energy*	65	10,793	U	1,050	666	2,548	-5	-55	-7
Central Maine Power	66	10,798	U	0	2,460	0	0	-31	0
Philadelphia Electric	67	10,834	D	2,572	3,394	1,762	-16	-43	-20
Wisconsin Energy*	68	10,835	-	8,381	56	769	NA	NA	NA
Montana Power*	69	10,839	U	3,718	23	279	-7	64	-15
St. Joseph Light & Power Co.	70	10,841	U	585	10	426	-6	-47	177
Southern Indiana Gas & Electric	71	10,851	U	2,405	0	142	-5	0	-21
Entergy Corp.*	72	10,873	U	5,354	1,439	201,051	-22	-22	11
Puget Sound Power & Light	73	10,880	D	3,280	11	135	-6	-94	-98
Kansas Gas & Electric	74	10,883	U	3,176	19	9,062	15	NA	-4
Iowa-Illinois Gas & Electric	75	10,895	D	2,485	8	356	-4	-11	19
Washington Water Power*	76	10,897	NA	2,075[2]	8	50	14	-11	9
Minnesota Power	77	10,931	U	3,884	0	0	1	0	0
Texas Utilities*	78	10,941	D	30,923	369	341,977	-1	-86	-3
Commonwealth Edison	79	10,972	D	10,005	1,506	269	18	11	-73
Nevada Power	80	11,003	D	2,421	260	6,404	-4	-15	13
Interstate Power	81	11,013	D	2,151	9	844	7	-10	11
Central Vermont Public Service	82	11,113	D	33[1]	47	139	-38	-36	1120
Public Service of New Mexico	83	11,147	U	3,698	0	242	-6	-88	-45
Empire District Electric	84	11,221	D	1,275	12	628	-84	-48	327
IE Industries*	85	11,344	U	950	27	NA	10	69	NA
KPL Gas Service	86	11,405	U	5,787	18	7,283	-7	-70	328
Otter Tail Power	87	11,510	D	1,933	4	0	-7	-100	0
Eastern Utilities Associates*	88	11,732	U	383	2,275	0	-26	-20	-100
Sierra Pacific Power	89	11,803	U	899	286	16,491	4	-20	7
Madison Gas & Electric	90	12,131	U	870	2	483	15	0	2
MDU Resources Group Inc.	91	12,173	D	1,517	4	137	-7	-50	954
Centel*	92	12,355	D	844	8	5,798	-4	-16	44
TNP Enterprises* (Tex-NM Power)	93	12,840	-	520	0	372	NA	NA	NA
Northeast Utilities*	94	INFORMATION NOT PROVIDED BY COMPANY							
San Diego Gas & Electric	95	INFORMATION NOT PROVIDED BY COMPANY							
Public Service of New Hampshire	96	INFORMATION NOT PROVIDED BY COMPANY							
Public Service Enterprise Group*	97	INFORMATION NOT PROVIDED BY COMPANY							
DQE*	98	INFORMATION NOT PROVIDED BY COMPANY							
Pacific Gas & Electric	99	INFORMATION NOT PROVIDED BY COMPANY							
Long Island Lighting	100	INFORMATION NOT PROVIDED BY COMPANY							

* Holding company
NA - Not Available/Not Applicable
[1] Wood [2] Coal & Wood [3] Coal, Wood & Refuse
0 (Change columns) - Less than 1% change and/or zero amounts in both years

Planning Council indicated the region as a whole might require. BPA currently provides half the electricity the area uses.

Gary Fuqua, BPA's acting assistant administrator for energy resources, said in June, "...this forecast reveals that if we lose part of our power base, or if we experience unusual growth, demand could outstrip supply in four of the next ten years."

Generation types

Those reporting to EL&P also confirmed the troubling, downward trend in capacity margins. Reporting utilities' total generation capacity declined from '89 to '90 (Table 3). Excluding the minor change in other types of generating capacity, the largest decline reported was a close to 12-percent drop in hydroelectric power, as might be expected from last year's lack of water to turn utility hydro turbines.

The drought in the Missouri River Basin was expected to continue, limiting its hydrogeneration. On the other hand, Hydro-Quebec's reserve improved, due to near-normal reservoir inflows, according to NERC. As a result, the Canadian utility removed the Tracy

TABLE 1.
FOSSIL FUEL CONSUMPTION

	1989	Change	1990	Change
Coal (million tons)	566	+8.7%	560	-1.0%
Oil (million bbl)	211	+29.6%	148	-29.8%
Gas (billion cu ft)	2,637	+20.8%	1,967	-25.4%

TABLE 2.
PEAK DEMAND AND RESERVE MARGINS

	1989	Change	1990	Change
Seasonal Peak (MW)	415,615	5.2%	406,160	-2.3%
Total System Capability (MW)	495,659	1.0%	480,029	-3.2%
System Reserve Margin	19.3%		18.2%	
Total Owned Capability (MW)	466,245	-0.4%	445,707	-4.4%
Owned Reserve Margin	12.2%		9.7%	
Average Load Factor	58.6		58.2	

TABLE 3.
TYPE OF GENERATION (MW)

Type	1989	Change	1990	Change
Conventional Steam	337,419	-1.4%	324,135	-3.9%
Nuclear	73,969	-1.6%	72,149	-2.5%
Combustion Turbine-Simple & Combined-Cycle	33,649	NA	33,599	-0.1%
Hydro & Pumped Storage	23,430	-1.5%	23,172	-12.3%
Other	4,339	NA	1,946	-55.2%
Total	475,806	-0.3%	455,000	-4.4%

OPERATING PERFORMANCES

thermal plant from supplying baseload generation and restarted sales of dual-energy contracts to commercial and industrial customers.

In the Western Systems Coordinating Council (WSCC) region, water supply conditions also varied by area. Water levels in the eastern part of the Northwest Power Pool were not good. The drought let up somewhat in the Arizona-New Mexico area, but generation in the Rocky Mountain area will be lowered from last year. Hydrogeneration also will be below normal in the California-Nevada area.

From the responses of those members of the Top 100 answering the survey, *EL&P* found their total nuclear output declined by 2.5 percent last year.

Heat rate leaders

The 20 most efficient fossil-fueled generating units with capacity factors above 50 percent were led by Colstrip-1 with a heat rate of 8610 Btu/kWh (Table 4). That pushed Central & Southwest's Comanche-1 unit out of its top place into No. 2, with its 8831 Btu/kWh rating.

Duke Power's Marshall-4 unit moved into the No. 3 spot; and Duke not only also claimed fourth place but, as in the past, also had two more, for a total of four, of the top 20 places in the listing.

Detroit Edison followed Duke in this respect, with two units in the top 20, as did Centerior Energy, Pennsylvania Power & Light and Florida Progress.

Rounding out the top-of-the-top compilations, Duke Power Company maintained its lead spot for having the best system heat rate of fossil-fueled boilers with a rate of 9468 Btu/kWh, which marks about the 15th year in a row as No. 1.

CMS Energy moved up to No. 2 in 1990 from 1989's No. 4 placing, while Cincinnati Gas & Electric took over No. 3, after placing No. 7 in last year's report. Continuing the leapfrogging, United Illuminating moved from No. 8 to No. 4, and Dominion Resources took No. 5, after not even being in the top 10 of 1989.

Heat rate improvements stop

Commonwealth Energy System moved up from '89's position of No. 2 to the top system heat rate spot (Table 6). And American Electric Power, Cincinnati Gas & Electric and New York State Gas & Electric all moved up one place, to Nos. 2, 3 and 4, respectively. Of course, they did so at the expense of previous No. 1 United Illuminating Co., which still showed up as a very respectible No. 5 with a heat rate of 9921 Btu/kWh.

Peak demand, down too

As already mentioned, the overall average reserve margin was still moving downwards (Table 2), just as it did in 1989. For although many system peaks went down, system capabilities went down even more. Total seasonal peak decreased by about 2 percent, but total system capability slid by about 3 percent. Thus, average overall system reserve margin for the Top 100 was reduced by nearly 1 percent, just between 1989 and 1990.

	Season Peak (MW)	Change (%)	Winter (W) or Summer (S)	Total System Capability at Time of Peak (MW)	Total System Reserve (%)	Owned Capability At Peak (MW)	Owned Reserve (%)	Load Factor (%)
Allegheny Power System*	6,070	-6.5	W	7,625	26	7,906	30	71.3
American Electric Power*	16,744	-5.4	S	22,107	32	22,254	33	67.2
Atlantic Energy*	1,741	2.4	S	1,954	12	1,409	-19	54.5
Baltimore Gas & Electric	5,477	3.1	S	6,634	21	5,457	-0	75.4
Bangor Hydro-Electric Company	251	NA	W	338	35	166	-34	78.3
Boston Edison	2,548	-3.0	S	3,475	36	2668	5	62.2
Carolina Power & Light	8,134	4.1	S	9,872	21	9,014	11	56.3
Centel*	INFORMATION NOT PROVIDED BY COMPANY							
Centerior Energy*	5,261	-3.1	S	6,597	25	6,597	25	63.6
Central Hudson Gas & Electric	871	-1.9	S	1,071	23	1,090	25	67.7
Central Illinois Public Service	1,657	4.5	S	2,459	48	2,647	60	55.5
Central Louisiana Electric	1,218	6.1	S	1,706	40	1,686	38	56.5
Central Maine Power	1,462	-5.4	W	1,930	32	1,103	-25	75.9
Central Vermont Public Service	386	-5.8	W	482	25	96	-75	67.9
Central & South West*	10,397	3.9	S	13,571	31	13,597	31	57.5
Cilcorp*	1,098	2.1	S	1,136	3	1,136	3	52.8
Cincinnati Gas & Electric	3,979	1.2	S	4,454	12	4,054	2	56.6
CMS Energy*	5,891	2.4	S	7,160	22	6,268	6	62.5
Commonwealth Edison	17,272	2.9	S	22,522	30	22,522	30	52.0
Commonwealth Energy System*	890	-3.2	S	1,156	30	198	-78	63.6
Consolidated Edison	8,388	-2.3	S	10,888	30	9,281	11	51.9
Delmarva Power & Light	2,235	0.9	S	2,503	12	2,503	12	61.0
Detroit Edison	9,032	3.8	S	9,953	10	9,948	10	54.9
Dominion Resources*	12,113	-4.6	S	13,647	13	11,832	-2	56.9
DPL*	2,643	3.4	S	2,657	1	2,657	1	57.9
DQE*	INFORMATION NOT PROVIDED BY COMPANY							
Duke Power	14,046	3.2	S	16,415	17	16,129	15	59.9
Eastern Utilities Associates*	850	2.3	S	1,146	35	614	-28	55.0
El Paso Electric	1,098	2.0	S	763	-31	1,498	36	66.7
Empire District Electric	668	4.7	S	787	18	642	-4	51.8
Entergy Corp.*	12,189	6.1	S	16,081	32	16,352	34	57.4
Florida Progress* (FPC)	5,946	2.0	S	6,927	16	6,041	2	53.4
FPL Group* (FP&L)	13,754	-1.7	S	10,896	-21	13,622	-1	55.3
General Public Utilities*	7,634	-1.0	S	9,140	20	6,870	-10	64.4
Green Mountain Power	302	NA	W	382	26	160	-47	69.5
Gulf States Utilities	5,388	6.9	S	6,453	20	6,392	19	64.4
Hawaiian Electric*	1,408	3.7	W	1,601	14	1,555	10	72.0
Houston Industries*	11,150	6.6	S	14,529	30	13,584	22	63.8
Idaho Power	2,168	-6.8	S	2,291	6	2,355	9	64.0
IE Industries*	1,005	1.4	S	1,260	25	1,081	8	55.7
Illinois Power	3,394	4.6	S	3,932	16	3,930	16	53.6
Interstate Power	1,700	89.7	S	1,054	-38	951	-44	61.9
Iowa Southern*	543	9.7	S	615	13	603	11	53.8
Iowa-Illinois Gas & Electric	1,055	0.2	S	1,273	21	1,424	35	53.0
IPALCO Enterprises*	2,498	4.7	S	2,883	15	2,829	13	54.8
Kansas City Power & Light	2,711	6.7	S	3,048	12	3,048	12	47.7
Kansas Gas & Electric	1,739	11.5	S	2,419	39	2,121	22	52.6
Kentucky Utilities	2,835	-2.9	S	3,355	18	3,150	11	56.5
KPL Gas Service	2,066	6.9	S	2,462	19	2,589	25	48.5
Long Island Lighting	INFORMATION NOT PROVIDED BY COMPANY							
Louisville Gas & Electric	2,149	6.3	S	2,281	6	2,281	6	50.7
Madison Gas & Electric	519	1.2	S	607	17	592	14	47.0
MDU Resources Group Inc.	382	-0.5	S	452	18	411	8	53.5
Midwest Resources*	2,274	130.9	S	2,720	20	2,394	5	49.2
Minnesota Power	1,248	-3.0	W	1,554	25	1,167	-6	85.0
Montana Power*	1,504	5.9	W	1,557	4	1,176	-22	62.0
Nevada Power	2,248	7.5	S	2,264	1	1,705	-24	50.2
New England Electric*	4,059	-3.9	S	5,331	31	3,988	-2	63.9
New York State Electric & Gas	2,491	-4.1	W	3,223	29	2,683	8	69.0
Niagara Mohawk Power	5,792	-9.2	W	7,596	31	5,625	-3	72.8
Northeast Utilities*	INFORMATION NOT PROVIDED BY COMPANY							
Northern Indiana Public Service	2,547	3.9	S	3,361	32	3,361	32	62.7
Northern States Power	6,733	3.0	S	7,815	16	6,793	1	57.4
Ohio Edison	5,394	4.7	S	6,195	15	5,828	8	65.0
Oklahoma Gas & Electric	4,584	7.9	S	5,703	24	5,703	24	48.3
Orange & Rockland Utilities	922	-2.0	S	1,157	25	1,005	9	53.5
Otter Tail Power	562	-4.4	W	728	30	631	12	61.2
Pacific Gas & Electric	INFORMATION NOT PROVIDED BY COMPANY							
PacifiCorp	7,623	10.9	W	9,141	20	6,860	-10	64.0
Pennsylvania Power & Light	5,661	-5.7	W	7,912	40	8,329	47	62.4
Philadelphia Electric	6,756	4.5	S	5,673	-16	8,766	30	57.5
Pinnacle West Capital*	3,680	2.1	S	4,452	21	4,374	19	63.9
Portland General*	3,698	5.1	W	4,101	11	2,278	-38	51.5
Potomac Electric Power	5,442	3.8	S	5,909	9	5,459	0	52.4
Public Service Enterprise Group*	INFORMATION NOT PROVIDED BY COMPANY							
Public Service of Colorado	3,606	3.5	W	4,195	16	3,004	-17	63.7
Public Service of Indiana	4,573	7.0	S	5,783	26	5,627	23	56.5
Public Service of New Hampshire	INFORMATION NOT PROVIDED BY COMPANY							
Public Service of New Mexico	1,051	4.5	S	1,687	61	1,326	26	62.9
Puget Sound Power & Light	4,615	7.4	W	4,707	2	1,557	-66	48.0
Rochester Gas & Electric	1,208	-3.3	S	1,594	32	1,238	2	64.6
San Diego Gas & Electric	INFORMATION NOT PROVIDED BY COMPANY							
SCANA Corporation* (SCE&G)	3,222	2.5	S	3,707	15	3,891	21	57.0
Sierra Pacific Power	989	7.3	W	1,173	19	836	-16	70.9
Southern California Edison	17,647	12.9	S	20,840	18	14,078	-20	54.0
Southern Company*	25,981	6.5	S	28,576	10	29,390	13	56.6
Southern Indiana Gas & Electric	984	4.6	S	1,163	18	1,163	18	58.6
Southwestern Public Service	3,251	7.7	S	4,051	25	4,051	25	61.4
St. Joseph Light & Power Co.	324	4.5	S	390	20	360	11	50.4
TECO Energy*	2,630	-3.0	S	2,934	12	3,191	21	60.8
Texas Utilities*	18,007	5.0	S	21,949	22	19,928	11	55.8
TNP Enterprises* (Tex-NM Power)	INFORMATION NOT PROVIDED BY COMPANY							
Tucson Electric Power	1,356	4.0	S	1,314	-3	1,594	18	56.0
Union Electric	7,094	3.6	S	7,814	10	7,442	5	52.6
United Illuminating	1,055	-3.6	S	1,450	37	1,361	29	60.0
Utilicorp United	990	NA	S	1,341	35	947	-4	49.0
Washington Water Power*	1,591	-4.2	W	1,544	-3	1,300	-18	62.1
Wisconsin Energy*	4,499	NA	S	4,852	8	4,767	6	63.1
Wisconsin Power & Light	1,798	1.2	S	1,855	3	1,910	6	61.9
Wisconsin Public Service	1,516	0.8	S	1,769	17	1,709	13	72.6

* Holding company
NA - Not Available/Not Applicable

Company	Conventional Steam (MW)	(%)	Last Year Change (MW)	Nuclear (MW)	(%)	Last Year Change (MW)	Combustion Turbine** (MW)	(%)	Last Year Change (MW)	Hydro & Pump Storage (MW)	(%)	Last Year Change (MW)	Other (MW)	(%)
Allegheny Power System*	7,089	89	85	0	0	0	0	0	0	902	11	0	0	0
American Electric Power*	20,865	87	0	2,130	9	0	18	0	0	836	4	0	0	0
Atlantic Energy*	792	49	5	373	23	0	441	27	82	0	0	0	9	1
Baltimore Gas & Electric	3,109	57	1	1,650	30	0	719	13	0	0	0	0	3	0
Bangor Hydro-Electric Company	111	66	NA	0	0	NA	0	0	NA	33	20	NA	23	14
Boston Edison	1,797	65	-3	669	24	2	296	11	88	0	0	0	0	0
Carolina Power & Light	5,102	57	0	2,676	30	0	1,018	11	0	218	2	0	0	0
Centel*	INFORMATION NOT PROVIDED BY COMPANY													
Centerior Energy*	4,305	65	-85	1,860	28	0	135	2	0	305	5	0	4	0
Central Hudson Gas & Electric	912	83	5	97	9	0	48	4	10	45	4	2	0	0
Central Illinois Public Service	2,644	100	10	0	0	0	0	0	0	0	0	0	3	0
Central Louisiana Electric	1,686	100	5	0	0	0	0	0	0	0	0	0	0	0
Central Maine Power	696	62	8	29	3	0	39	3	-4	366	32	25	0	0
Central Vermont Public Service	22	19	0	20	17	0	29	25	0	43	37	1	2	2
Central & South West*	12,276	87	23	630	4	0	524	4	2	0	0	0	714	5
Cilcorp*	1,106	97	0	0	0	0	30	3	0	0	0	0	0	0
Cincinnati Gas & Electric	3,579	88	0	0	0	0	475	12	0	0	0	0	0	0
CMS Energy*	4,028	64	-148	822	13	0	395	6	0	1,023	16	0	0	0
Commonwealth Edison	9,703	43	0	11,487	51	0	1,310	6	1	0	0	0	22	0
Commonwealth Energy System*	1,005	93	-19	25	2	25	38	3	-10	0	0	0	17	2
Consolidated Edison	6,228	68	-95	919	10	70	2,067	22	-9	0	0	0	0	0
Delmarva Power & Light	1,798	72	4	321	13	0	361	14	0	0	0	0	23	1
Detroit Edison	7,479	74	21	1,075	11	104	507	5	129	917	9	0	147	1
Dominion Resources*	6,185	50	-7	3,170	26	-10	1,441	12	535	1,592	13	0	0	0
DPL*	2,469	93	0	0	0	0	149	6	0	0	0	0	34	1
DQE*	INFORMATION NOT PROVIDED BY COMPANY													
Duke Power	6,994	43	259	7,054	43	0	599	4	0	1,647	10	195	0	0
Eastern Utilities Associates*	512	78	3	80	12	34	0	0	0	0	0	0	64	10
El Paso Electric	828	55	0	602	40	0	69	5	0	0	0	0	0	0
Empire District Electric	414	63	-21	0	0	0	228	35	0	16	2	0	0	0
Entergy Corp.*	12,108	73	0	3,797	23	0	528	3	0	70	0	0	6	0
Florida Progress* (FPC)	4,152	63	0	744	11	52	1,675	25	230	0	0	0	0	0
FPL Group* (FP&L)	8,379	62	7	2,885	21	0	2,344	17	0	0	0	0	14	0
General Public Utilities*	3,657	53	0	1,428	21	0	1,480	22	1162	305	4	0	0	0
Green Mountain Power	14	11	1	0	0	0	75	57	-4	36	27	0	7	5
Gulf States Utilities	5,592	90	-655	655	10	0	0	0	0	0	0	0	0	0
Hawaiian Electric*	1,268	82	-10	0	0	0	130	8	1	0	0	0	157	10
Houston Industries*	11,404	84	-30	770	6	0	1,410	10	0	0	0	0	0	0
Idaho Power	996	35	4	0	0	0	50	2	0	1,773	63	43	0	0
IE Industries*	538	50	20	375	35	7	163	15	1	0	0	0	6	1
Illinois Power	3,340	78	0	807	19	0	138	3	0	0	0	0	0	0
Interstate Power	896	94	0	0	0	0	44	5	0	0	0	0	11	1
Iowa Southern*	574	95	0	0	0	0	27	4	27	0	0	0	6	1
Iowa-Illinois Gas & Electric	907	64	0	385	27	0	129	9	31	3	0	0	0	0
IPALCO Enterprises*	2,755	97	0	0	0	0	60	2	0	0	0	0	14	0
Kansas City Power & Light	2,128	70	23	533	17	0	387	13	0	0	0	0	0	0
Kansas Gas & Electric	1,905	78	8	534	22	0	0	0	0	0	0	0	3	0
Kentucky Utilities	3,067	97	-8	0	0	0	59	2	0	24	1	0	0	0
KPL Gas Service	2,249	87	-1	0	0	0	340	13	1	0	0	0	0	0
Long Island Lighting	INFORMATION NOT PROVIDED BY COMPANY													
Louisville Gas & Electric	2,629	96	495	0	0	0	108	4	0	0	0	0	0	0
Madison Gas & Electric	427	67	3	94	15	0	115	18	0	0	0	0	0	0
MDU Resources Group Inc.	361	83	2	0	0	0	74	17	14	0	0	0	0	0
Midwest Resources*	1,868	75	883	0	0	0	625	25	422	0	0	0	0	0
Minnesota Power	1,051	90	-107	0	0	0	0	0	0	116	10	0	0	0
Montana Power*	687	58	-212	0	0	0	0	0	0	489	42	-29	0	0
Nevada Power	1,337	76	25	0	0	0	399	23	0	0	0	0	30	2
New England Electric*	2,599	64	-21	254	6	113	0	0	0	1,168	29	5	56	1
New York State Electric & Gas	2,414	90	0	194	7	1	0	0	0	68	3	2	7	0
Niagara Mohawk Power	3,655	65	1	1,051	19	1	211	4	-19	708	13	28	0	0
Northeast Utilities*	INFORMATION NOT PROVIDED BY COMPANY													
Northern Indiana Public Service	3,145	94	0	0	0	0	206	6	-35	10	0	0	0	0
Northern States Power	3,874	57	-31	1,542	23	2	1,151	17	24	262	4	6	0	0
Ohio Edison	4,799	78	152	1,194	19	7	138	2	25	0	0	0	26	0
Oklahoma Gas & Electric	5,633	99	-12	0	0	0	59	1	0	0	0	0	0	0
Orange & Rockland Utilities	887	88	-16	0	0	0	74	7	0	44	4	0	0	0
Otter Tail Power	539	85	4	0	0	0	87	14	0	4	1	0	1	0
Pacific Gas & Electric	INFORMATION NOT PROVIDED BY COMPANY													
PacifiCorp	6,124	84	14	27	0	0	14	0	-1	1,103	15	0	21	0
Pennsylvania Power & Light	5,785	69	0	1,890	23	0	486	6	0	146	2	0	22	0
Philadelphia Electric	2,769	32	0	3,938	45	1055	756	9	-48	1,290	15	0	13	0
Pinnacle West Capital*	2,291	55	196	1,109	27	0	754	18	0	6	0	0	0	0
Portland General*	646	24	-24	745	28	0	650	24	0	611	23	0	6	0
Potomac Electric Power	4,809	88	0	0	0	0	649	12	84	0	0	0	1	0
Public Service Enterprise Group*	INFORMATION NOT PROVIDED BY COMPANY													
Public Service of Colorado	2,474	82	0	0	0	0	209	7	38	306	10	221	16	1
Public Service of Indiana	5,386	96	10	0	0	0	0	0	0	45	1	-10	196	3
Public Service of New Hampshire	INFORMATION NOT PROVIDED BY COMPANY													
Public Service of New Mexico	1,181	74	0	390	25	0	20	1	0	0	0	0	0	0
Puget Sound Power & Light	858	46	0	0	0	0	700	37	1	310	17	0	3	0
Rochester Gas & Electric	541	44	0	621	50	0	29	2	0	47	4	0	0	0
San Diego Gas & Electric	INFORMATION NOT PROVIDED BY COMPANY													
SCANA Corporation* (SCE&G)	2,286	59	0	590	15	0	259	7	0	756	19	0	0	0
Sierra Pacific Power	742	89	0	0	0	0	37	4	0	7	1	0	50	6
Southern California Edison	8,769	62	0	2,541	18	0	1,614	11	0	1,154	8	1	8	0
Southern Company*	22,613	76	48	3,428	12	11	1,171	4	0	2,592	9	0	0	0
Southern Indiana Gas & Electric	1,028	88	0	0	0	0	135	12	0	0	0	0	0	0
Southwestern Public Service	3,945	97	0	0	0	0	92	2	0	0	0	0	14	0
St. Joseph Light & Power Co.	278	73	2	0	0	0	103	27	23	0	0	0	0	0
TECO Energy*	3,003	94	49	0	0	0	188	6	0	0	0	0	0	0
Texas Utilities*	17,803	89	-1	1,150	6	1150	975	5	390	0	0	0	0	0
TNP Enterprises* (Tex-NM Power)	0	0	-39	0	0	0	0	0	-11	0	0	0	156	100
Tucson Electric Power	1,473	87	360	0	0	0	218	13	0	0	0	0	0	0
Union Electric	5,351	71	44	1,125	15	0	374	5	0	681	9	50	5	0
United Illuminating	1,136	81	15	243	17	201	0	0	0	0	0	0	22	2
Utilicorp United	652	69	0	0	0	0	294	31	0	0	0	0	0	0
Washington Water Power*	453	31	0	0	0	0	68	5	0	946	64	0	0	0
Wisconsin Energy*	3,441	72	NA	990	21	NA	258	5	NA	75	2	NA	0	0
Wisconsin Power & Light	1,454	78	-9	213	11	-5	174	9	-8	21	1	-20	1	0
Wisconsin Public Service	1,277	75	0	219	13	0	153	9	0	54	3	0	4	0

* Holding company
NA - Not Available/Not Applicable
** Simple and combined-cycle
0 (in change columns) - Less than 1% and/or zero in both years

Some prime examples of utilities with large negative system reserve margins are: Interstate Power, at -38 percent; El Paso Electric, at -31 percent; and FPL Group, at -21 percent (Table 7).

Added types of generation

The Top 100 may have reported less generation capacity in all categories because they are buying more power from cogenerators and independent power producers.

On the other hand, companies adding large amounts of conventional steam capacity last year included Midwest Resources, which added 883 MW; Louisville Gas & Electric, 495 MW; and Eastern Utilities Associates, 259 MW (Table 8).

Those that sharply reduced their steam capacity were Montana Power, at 212 MW less and CMS Energy, at minus

TABLE 4.
TOP GENERATING UNITS BY HEAT RATE
(capac. factor >50%)

Rank & Unit	Capacity (MW)	Reporting Utility	Heat Rate (Btu/kWh)
1. Colstrip-1	233	Washington Water Power	8,610
2. Comanche Power -1	260	Central & Southwest	8,901
3. Belews Creek-2	1120	Duke Power	9,017
4. Marshall-3	660	Duke Power	9,112
5. Canal Plant-1	569	Commonwealth Energy	9,211
6. Fort Martin	555	Allegheny Pwr. System	9,211
7. Monroe-3	750	Detroit Edison	9,240
8. Eastlake	411	Centerior Energy	9,242
9. Conemaugh-2	33	Delmarva Pwr. & Light	9,251
10. Morgantown-2	582	Potomac Electric Pwr. Co.	9,254
11. Montour-2	750	Pennsylvania Pwr. & Light	9,273
12. Bayshore	215	Centerior Energy	9,296
13. J.H. Campbell-3	719	CMS Energy	9,307
14. Crystal River-4	717	Florida Progress	9,307
15. Marshall-2	385	Duke Power	9,308
16. Marshall-1	385	Duke Power	9,321
17. J.M. Stuart-2	228	Cincinnati Gas & Electric	9,326
18. Crystal River-5	717	Florida Progress	9,352
19. Monroe-1	750	Detroit Edison	9,358
20. Montour-1	765	Pennsylvania Pwr. & Light	9,361

TABLE 5.
TOP SYSTEM HEAT RATES, CONVENTIONAL FOSSIL-FUELED BOILERS

Utility	Heat Rate (Btu/kWh)
1. Duke Power	9,468
2. CMS Energy	9,701
3. Cincinnati Gas & Electric	9,794
4. United Illuminating	9,866
5. Dominion Resources	9,870
6. Dayton Power & Light	9,880
7. New York State Electric & Gas	9,883
8. Florida Progress	9,936
9. Allegheny Power System	9,944
10. Potomac Electric Power	9,961

OPERATING PERFORMANCES

148 MW.

In terms of nuclear, Detroit Edison says it added 104 MW of this type of capacity to its portfolio; New England Electric added 113 MW with its Seabrook share; Philadelphia Electric started the Limerick-2 unit for an additional 1055 MW; and Texas Utilities started up 1150 MW of nuclear power capacity with Comanche Peak-1.

In spite of all the industry interest in large combustion turbines, they did not seem to be of great interest to the Top 100. Reported totals actually showed close to a 1-percent net decline in combustion turbine capacity in 1990.

General Public Utilities, however, added 1162 MW in this category in 1990; Dominion Resources added 535 MW; Texas Utilities, 390 MW; and Wisconsin Energy, 258 MW.

Transmission & distribution

As usual, the overall picture is one of adding transmission and distribution lines. Most utilities reducing mileage in one category only added it somewhere else.

In toto, though, the Top 100 electric utilities added 2,855 miles of transmission lines, 18,810 miles of overhead distribution lines and 27,355 miles of underground distribution lines.

Texas utilities alone increased its transmission lines by 12,761 circuit miles: 8,956 miles of below-189 kV and 3,805 above 189 kV. Montana Power reported that it added 5,627 miles of below-189-kV transmission and 1,445 miles of above 189 kV, and Niagara Mohawk Power installed 8,132 circuit miles and 1,127 circuit miles, respectively. But the high-water mark was hit by Southern Company, which added 19,944 miles below 189 kV and 6,420 miles of line above that voltage, for total transmission lines added of 26,364 circuit miles.

Note that in distribution lines, the utilities reporting to *EL&P* were still putting in more underground than overhead distribution lines by about a two-to-one margin. As in previous years, the large majority of additions was rated 22 kV and below.

Despite the transmission additions reported, NERC said that portions of the bulk electric transmission systems could be loaded to their reliability limits much of the time during the summer months by intersystem transfers. And increased use of operating procedures to get around equipment limitations complicates the work of system operators and decreases their degree of flexibility to meet day-to-day operations problems.

One potential transfer problem listed by NERC was that portions of the eastern transmission system in ECAR would continue to be loaded heavily much of the time during the summer. A set of procedures would have to be followed to limit transfers to ensure system reliability. Another potential problem was Central Power & Light Co., which would have to monitor its transfer capability closely until a planned 345-kV line was approved and built.

	Transmission				Distribution							
					Overhead				Underground			
	Below 189 kV (circuit miles)	Miles Added	189 kV & Up (circuit miles)	Miles Added	Below 22 kV (pole miles)	Miles Added	22 kV & Up (pole miles)	Miles Added	Below 22 kV (cable miles)	Miles Added	22 kV & Up (cable miles)	Miles Added
Allegheny Power System*	3,541	85	1,109	2	48,931	-1202	4,646	36	4,232	399	30	8
American Electric Power*	15,803	8	5,926	0	93,276	371	6,236	339	8,308	1026	597	120
Atlantic Energy*	1,219	25	97	33	9,021	54	0	0	923	19	0	0
Baltimore Gas & Electric	649	-9	505	10	NA	NA	732	0	NA	NA	350	0
Bangor Hydro-Electric Company	580	NA	0	NA	3,091	NA	0	NA	0	NA	0	NA
Boston Edison	200	0	162	0	4,653	42	0	0	7,805	282	0	0
Carolina Power & Light	3,103	-8	3,065	14	NA	NA	38,415	253	NA	NA	5,679	497
Centel*	NA	NA	2,963[1]	NA	NA	NA	6,732	48	NA	NA	731	13
Centerior Energy*	0	0	0	0	16,573	42	0	0	6,873	67	20	0
Central Hudson Gas & Electric	526	0	76	0	6,467	29	46	0	1,017	86	0	0
Central Illinois Public Service	4,255	-12	305	0	8,324	17	0	0	747	26	0	0
Central Louisiana Electric	801	0	363	0	0	0	10,924	129	0	0	303	27
Central Maine Power	2,023	-1	208	0	17,518	269	325	1	946	71	12	0
Central Vermont Public Service	624	1	0	0	7,349	44	0	0	184	15	0	0
Central & South West*	13,995	-33	1,813	-152	56,526	518	582	9	6,472	-40	362	1
Cilcorp*	284	0	47	0	5,597	-3	614	-1	1,796	29	7	0
Cincinnati Gas & Electric	1,330	7	383	0	9,066	24	552	9	2,394	111	36	3
CMS Energy*	7,943	0	1,918	0	49,091	416	0	0	7,526	656	0	0
Commonwealth Edison	2,467	21	2,552	0	0	NA	36,308	217	0	NA	26,267	1482
Commonwealth Energy System*	300	0	61	0	3,698	-32	2,086	24	2,735	103	1,077	57
Consolidated Edison	22	0	409	0	25,422	22	516	11	58,801	223	6,982	164
Delmarva Power & Light	1,136	10	263	0	1,815	-1	4,832	63	1,071	69	2,661	200
Detroit Edison	4,447	11	1,031	1	30,496	205	0	0	8,803	453	0	0
Dominion Resources*	2,774	-23	3,146	49	NA	NA	37,545	331	NA	NA	17,047	595
DPL*	1,347	2	448	0	NA	NA	NA	NA	NA	NA	NA	NA
DQE*	INFORMATION NOT PROVIDED BY COMPANY											
Duke Power	9,396	16	3,153	53	49,164	-131	9,557	-1	5,795	528	2,903	264
Eastern Utilities Associates*	185	2	178	0	893	3	3,277	-8	279	14	832	3
El Paso Electric	704	-7	1,109	269	3,218	48	1,526	21	864	23	143	7
Empire District Electric	1,261	4	22	0	4,986	77	0	0	263	13	0	0
Entergy Corp.*	7,208	1	3,065	19	67,696	511	4,789	40	3,950	226	1,683	6
Florida Progress* (FPC)	2,753	39	1,561	4	NA	NA	NA	NA	4,816	343	0	0
FPL Group* (FP&L)	2,245	-11	3,304	11	NA	NA	37,238	706	NA	NA	15,540	1037
General Public Utilities*	4,484	42	2,216	12	42,493	-133	5,896	529	15,753	754	1,611	146
Green Mountain Power	281	0	0	0	2,267	9	21	1	325	15	9	2
Gulf States Utilities	3,142[1]	-2[1]	1,034[1]	0	18,377	113	1,415	8	1,708	-65	117	2
Hawaiian Electric*	1,473	3	0	0	4,067	49	0	0	2,191	-287	0	0
Houston Industries*	2,541	37	1,030	-2	18,235	81	1,500	43	4,726	299	1,341	97
Idaho Power	3,187[1]	-54[1]	1,481[1]	0	12,922	-75	4,256	51	5,065	183	262	30
IE Industries*	3,193	0	67	0	4,723	5	0	0	2,081	123	0	0
Illinois Power	2,324	2	484	0	16,744	-30	1,327	-4	1,256	46	4	0
Interstate Power	2,522	4	74	0	0	0	NA	NA	614	25	0	0
Iowa Southern*	932	0	61	0	3,150	-4	0	0	NA	NA	492	14
Iowa-Illinois Gas & Electric	632	0	305	0	4,686	12	0	0	1,289	1289	0	0
IPALCO Enterprises*	602	-2	454	0	4,696	9	0	0	5,078	223	0	0
Kansas City Power & Light	1,376	-3	295	0	8,903	22	0	0	6,115	186	0	0
Kansas Gas & Electric	1,599	3	663	0	7,768	2	0	0	2,340	99	0	0
Kentucky Utilities	4,277	9	412	0	14,701	122	0	0	977	34	0	0
KPL Gas Service	3,612	2	791	0	12,592	-24	0	0	1,408	103	0	0
Long Island Lighting	INFORMATION NOT PROVIDED BY COMPANY											
Louisville Gas & Electric	760	0	133	2	3,335	14	106	0	2,358	231	0	0
Madison Gas & Electric	194	16	124	0	1,075	0	0	0	869	44	0	0
MDU Resources Group Inc.	2,831	0	319	0	2,832	8	0	0	1,751	-15	0	0
Midwest Resources*	3,246	1100	530	346	11,550	11550	0	0	2,726	NA	NA	NA
Minnesota Power	1,543[1]	2[1]	607[1]	0	3,861	70	647	11	1,026	28	4	0
Montana Power*	5,627	63	1,445	0	13,033	36	0	0	0	0	0	0
Nevada Power	686	118	757	119	2,958	15	0	0	4,271	395	0	0
New England Electric*	1,994	1	684	0	16,975	157	754	-9	7,690	209	332	112
New York State Electric & Gas	3,786	-3	813	0	31,108	228	1,921	-13	0	0	0	0
Niagara Mohawk Power	8,132	67	1,127	1	0	NA	109,266	317	0	NA	8,140	244
Northeast Utilities*	INFORMATION NOT PROVIDED BY COMPANY											
Northern Indiana Public Service	2,665	6	354	22	7,650	14	0	0	939	63	0	0
Northern States Power	5,464	56	1,467	7	28,130	66	0	0	12,501	457	0	0
Ohio Edison	4,898	5	628	-0	24,968	76	0	0	3,925	284	0	0
Oklahoma Gas & Electric	3,622	6	982	0	0	0	20,618	44	0	0	5,895	93
Orange & Rockland Utilities	471	0	80	0	4,796	40	0	0	1,253	90	0	0
Otter Tail Power	4,863	0	411	0	0	0	0	0	0	0	0	0
Pacific Gas & Electric	INFORMATION NOT PROVIDED BY COMPANY											
PacifiCorp	9,553	4	5,828	263	0	NA	44,215	62	NA	NA	NA	NA
Pennsylvania Power & Light	0	0	1,308	0	49,852	428	2,423	26	669	726	14	0
Philadelphia Electric	179	0	774	7	12,264	40	61	0	18,151	813	17	0
Pinnacle West Capital*	2,378[1]	19[1]	2,419[1]	0	10,809	78	0	0	7,462	233	0	0
Portland General*	945[2]	12[2]	1,038[2]	-0	8,775	6	0	0	5,754[2]	435[2]	0	0
Potomac Electric Power	26	0	788	5	4,505	-6	356	28	11,210	92	793	1
Public Service Enterprise Group*	INFORMATION NOT PROVIDED BY COMPANY											
Public Service of Colorado	1,609	22	1,405	31	11,504	15	1,527	6	5,769	120	277	30
Public Service of Indiana	4,015	10	1,392	0	18,262	12	0	0	3,016	144	0	0
Public Service of New Hampshire	INFORMATION NOT PROVIDED BY COMPANY											
Public Service of New Mexico	892	4	1,896	0	4,772	38	0	0	2,451	58	0	0
Puget Sound Power & Light	1,847[1]	-2[1]	401[1]	0	10,101	-84	137	0	5,240	273	26	2
Rochester Gas & Electric	706	1	0	0	6,759	40	0	0	4,301	149	0	0
San Diego Gas & Electric	INFORMATION NOT PROVIDED BY COMPANY											
SCANA Corporation* (SCE&G)	2,413	1	789	1	6,463	141	7,919	166	109	-3	97	4
Sierra Pacific Power	2,709	4	914	0	6,873	63	1,350	32	431	-237	2,649	158
Southern California Edison	6,556	-39	5,047	-279	NA	NA	44,951	135	56,487	6126	196	6
Southern Company*	19,944	-9	6,420	80	NA	NA	94,865	1111	NA	NA	21,499	1847
Southern Indiana Gas & Electric	864	5	0	0	3,176	0	0	0	873	38	0	0
Southwestern Public Service	4,027	5	1,515	0	NA	NA	NA	NA	NA	NA	NA	NA
St. Joseph Light & Power Co.	416	0	117	0	2,195	17	0	0	149	9	0	0
TECO Energy*	813	12	354	-3	6,709	22	0	0	2,132	64	0	0
Texas Utilities*	8,956	20	3,805	-31	48,208	-40	5,080	382	8,581	479	2,380	155
TNP Enterprises* (Tex-NM Power)	1,248[1]	0	253[1]	177[1]	9,008	53	0	0	488	5	0	0
Tucson Electric Power	264	-61	1,633	129	7,651	290	475	-11	3,487	173	0	0
Union Electric	2,202	0	988	0	20,790	179	3,955	-52	9,706	364	359	0
United Illuminating	91	0	6	0	3,077	0	0	0	1,126	30	3	1
Utilicorp United	1,273[1]	26[1]	58[1]	0	6,727	90	108	4	849	94	16	16
Washington Water Power*	1,509[1]	1[1]	657[1]	0	8,709	23	591	3	1,486	56	0	0
Wisconsin Energy*	1,937	NA	685	NA	0	NA	22,608	NA	0	NA	10,880	NA
Wisconsin Power & Light	2,686	3	107	0	16,911	39	0	0	1,433	86	0	0
Wisconsin Public Service	1,504	12	124	0	NA	NA	18,048	-1484	NA	NA	1,957	28

* Holding company

NA -Not Available/Not Applicable

[1] Pole Miles

[2] Conduit Bank Miles

WAYNE BEATY, Senior Editor—T/D

Utilities manage fleet systems efficiently, says survey

NEW YORK—Most utilities have transportation departments, maintain information systems to manage their fleets more efficiently and do a majority of maintenance in-house, according to Stone & Webster's Fifth Utility Fleet Management Survey.

Some 118 electric, gas, and combination utilities throughout the U.S., Canada, and the Caribbean responded to the 1990 survey.

To provide a basis for comparing data among utilities with different fleet size and mixed characteristics, Stone & Webster used a "maintenance and repair unit (MRU)" as a common equivalent element in quantifying maintenance work load, analyzing staffing and facility requirements and evaluating fleet performance data.

One MRU is equivalent to 20 mechanic-hours per year. The number of MRUs is the total number of vehicles in a particular class multiplied by a maintenance and repair factor (MRF).

Fig. 1 shows the MRF for different classes of vehicles or equipment.

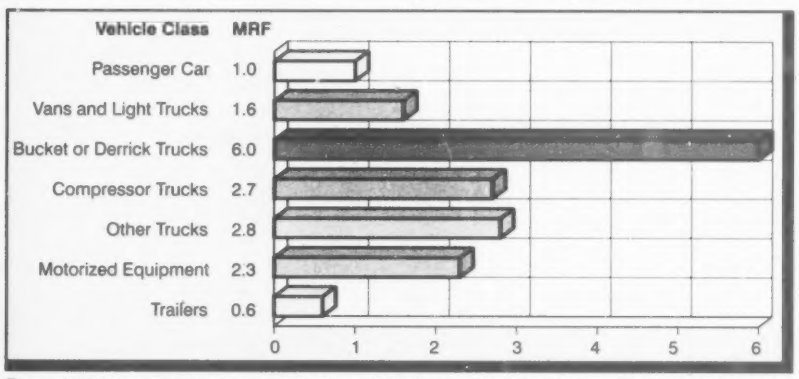


Figure 1. Maintenance requirements vary by vehicle class and are compared with a maintenance and repair factor (MRF) derived from the survey.

The average amount of maintenance work done in-house was 84 percent (see Table below). The type of work most frequently contracted out was for body and paint work, driveline repairs, alignments, glass work, tire repairs and engine work.

Fleet Maintenance and Operations Utility Survey Responses	%
Have transportation department	93
Use work standards	34
Have computerized fleet system	80
Developed system in-house	72
Automated fuel dispensing system	40
Rebuild aerial units in-house	35
Rebuild truck bodies in-house	31
Provide maint. on non-co. units	8
Avg. amt. of work done in-house	84

Passenger cars, vans, and light trucks comprise about 50 percent of a utility's fleet (Fig. 2). Vehicle utilization, replacement and age varies by vehicle class.

Passenger cars are driven about 12,600 miles per year and are replaced generally after 5 years or 80,000 miles. The average age of this class for those responding was 3 years.

Vans and light trucks are driven about the same. The guidelines for replacement is 6 years or 90,000 miles. The average age for this class was 4 years.

Bucket trucks are driven 10,000 miles annually or 1,200 hours with replacement guidelines at 10 years or 100,000 miles. The average age of the fleet for this class was 5 years.

Derrick trucks are driven 6300 miles or 900 hours. Replacement guidelines for this class was also 10 years or 100,000 miles. The age for this class was 6 years.

Alternate fuels

Of those fleets with both natural gas or other alternative fuels and gasoline units, about 3.9 percent use natural gas. Of the 5142 vehicles using fuels other than gasoline, 77 percent used natural gas (Fig. 3). The rest used propane, methanol or electricity.

Natural gas and other alternative fuels for vehicles will become increasingly important in the future, according to the survey results. Some 47 percent of the utilities either have or plan to have natural gas vehicles (NGV). The NGV fleet is already at 3.9 percent. Maintenance on the NGV fleet is about the same as for other fuels, according to 45 percent of those responding. Some 31 percent said they cost more to maintain and 24 percent said they cost less.

The forecasted growth rate in NGV was 18 percent per year. Some 39 percent said they either have or plan to have other alternate fuel vehicles.

Maintenance

For every two mechanics and working foremen, there is one other employee involved in a transportation support, supervisory or management role (Fig. 4). About one-fourth of the utilities said their mechanics work only one shift (Fig. 5, see p. 26). Some 62 percent work two shifts and 12 percent work three shifts.

Personnel and facility resources are directly related to the maintenance workloads:

- In-house MRUs per transportation employee: 33.1.
- In-house MRUs per maintenance work bay: 61.3.
- Average number of work bays per mechanic: 1.25.

The location of maintenance facilities is usually determined by population density. The radius in miles by location is:

- Center city: 16 miles.
- Suburban: 25 miles.
- Rural: 50 miles.

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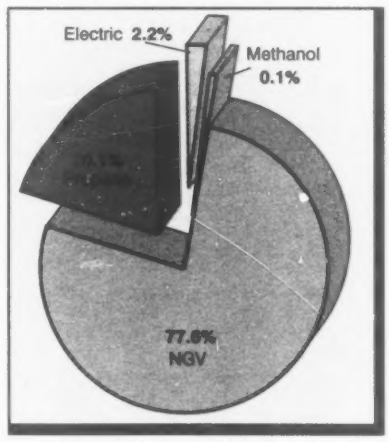

Figure 3. Natural gas and other alternate fuel vehicles will become increasingly important in the future. About four percent of the 5142 vehicles now use NG.

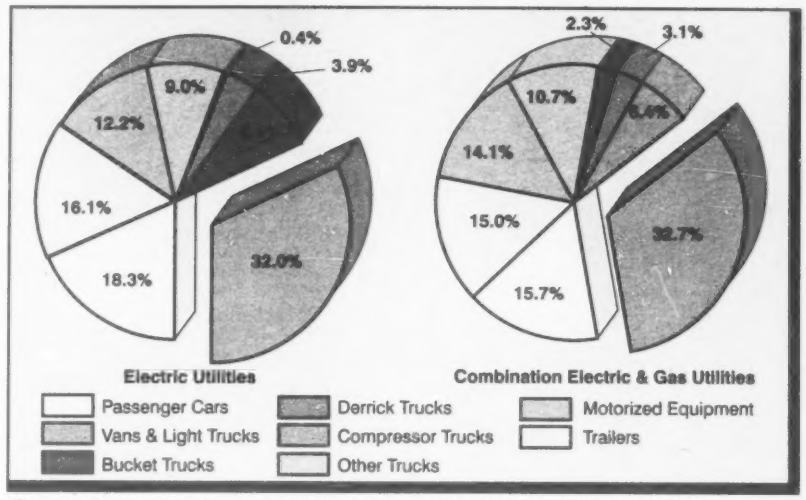

Figure 2. Passenger cars, van, and light trucks comprise about one-half of a utility's fleet.

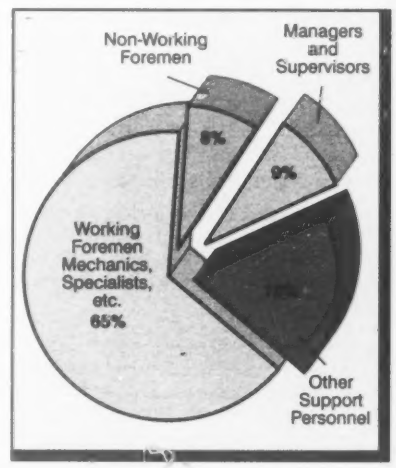

Figure 4. For every two mechanics and working foremen, there is one other employee involved in a transportion support, supervisory or management role.

Should computers speak the same language?

COLUMBUS, OH—The modern utility relies on data from dozens of computers to operate efficiently, but many of these machines don't speak the same language.

Research is underway, however, to develop standards and protocols for integrating these data systems across the spectrum of utility operations.

At the recent annual meeting of the Utilities Telecommunications Counsel (UTC), Robert A. Prichard Jr., telecommunications network planning manager at Public Service of Colorado, presented reasons why utilities should adopt the Utilities Communication Architecture (UCA).

The UCA background

UCA is the result of earlier research by the Electric Power Research Institute (EPRI) in developing specific communications protocol based on the Open Systems Interconnection (OSI) reference model. It was designed to meet utility industry requirements and provide an evolutionary path for the development of interoperable communications systems within the industry.

UCA version 1.0 was introduced in August 1990, and the response was favorable but somewhat cautious, according to Prichard. EPRI and its sponsors are convinced that a standards-based approach is the best way to develop interoperable systems.

Two issues involved

Prichard says there is a level of stability in a utility's communication structure and there must be compelling business reasons to consider significant change and endure its associated discomfort.

He points out that the commitment to a change to UCA has been a measured one simply because there is not a direct answer to the question, "What is the impact of a decision to implement the UCA?"

The decision to commit to UCA can be reduced to two fundamental issues:

- Why should a utility adopt the UCA?
- How can the UCA be used to select telecommunications products?

The why of UCA

Prichard says the "why" is a management decision based on controlling financial and technical risk. These two factors are the driving force behind two basic reasons why individual utility companies should adopt the UCA:

- The UCA provides a standard set of applications and communications protocols that address the specific needs of the utility industry. Employing this standard enables a utility to control the effects of the increasing rate of change in telecommunications technology. It provides better control over changes in products in the market place.
- The set of applications and communications services identified by the UCA can be used to develop a business-based transition plan that provides for maximum use of existing system assets and reduces the risk in acquiring future assets.

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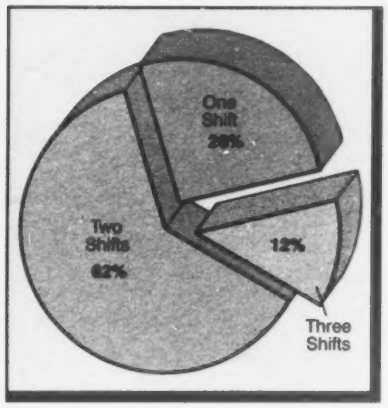
Fleet systems...



Some 80 percent of those responding had computerized fleet information systems and most were developed in-house (Fig. 6). Mainframe computers are used by those utilities with 2000 or more fleet vehicles. For those with fewer than 500 vehicles, PCs are used by 63 percent of the utilities. For those in the 1000 to 1999 fleet size, minicomputers are used by 14 percent.

Fleet cost and performance

A number of economic and other ratios can be examined to review a utility's fleet performance. The average economic ratios include:

- Maintenance cost (1989): $1350/MRU; 35¢/mile.

◆ Figure 5. Two-shift operations predominate among fleet owners.

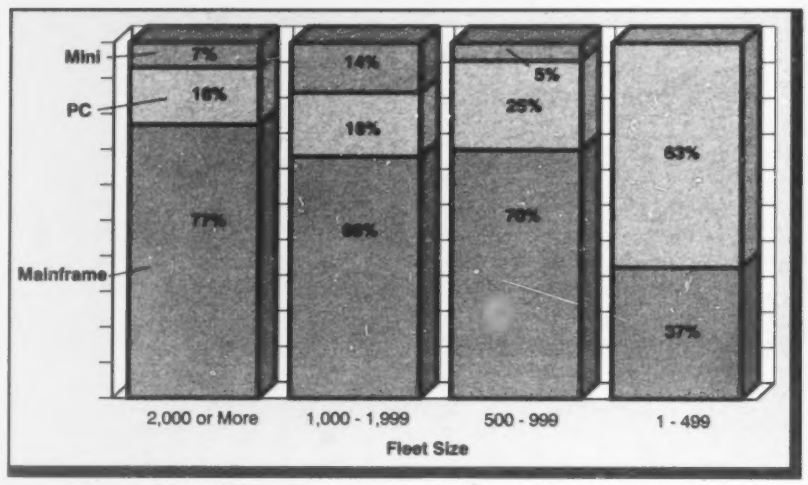


Figure 6. Mainframe computers predominate, except in fleets with fewer than 500 vehicles.

- Fuel and lubrication (1989): $430/MRU; 10¢/mile.
- Replacement budget (1989): $1230/MRU.
- Replacement budget (1990): $1240/MRU.

Performance ratios include:

- Average vehicle miles/gallon: 10.2.
- Average miles traveled per vehicle per year: 11,130.
- Proportion of work that is scheduled: 45 percent.
- Overall fleet downtime rate: 3 percent.
- Parts turnover per year: 3.3.

The per fleet size per month data includes:

- Repair orders completed: 0.79/MRU.
- Downtime hours: 0.94/MRU.
- Road calls: 0.4/MRU.

More information

For more information on this survey contact: Sal Bibona, Stone & Webster Management Consultants Inc., One Penn Plaza, New York, NY 10019; Ph. 212/290-7115; fax 212/290-7033.

Ericsson GE Gives You The Best In Radio Communications. But Don't Take Our Word For It...

"From the beginning of our planning for the new system, we made every effort to ensure that it will meet end-user requirements, both today and well into the future. We expect our wide-area system to promote greater efficiency in our daily operations. With improved communications, we will be able to respond faster in emergencies and offer our customers better overall service."

George Schindler
Supervising Engineer for Communications & Special Projects
Union Electric Co.
St. Louis, Missouri

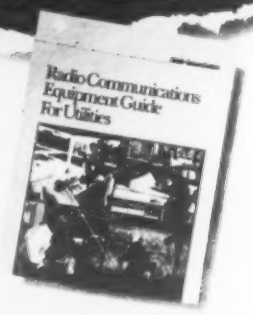
"GE has just completed installation of our eight-site, 10-channel, trunked simulcast radio system here in San Diego County. We've been very impressed with the quality of the installation; the equipment; the system design and engineering; and the overall performance of the 16[plus] system. GE has demonstrated to us their position as the technical leader in the field of trunked two-way radio communications."

Russ Collins
Manager of Telecommunications
San Diego Gas & Electric Co.
San Diego, California

"GE was responsive in listening to our needs, and used their resources to design accordingly. We needed a system to replace our low-band system, and we needed to improve coverage in our 40 x 80 mile service area. GE's four-site conventional 800 MHz system did the job with margin to spare. The coverage was much improved."

John Newland
System Engineer
Henderson Union Rural Electric Cooperative Corporation
Henderson, Kentucky

Why are utilities across the country choosing Ericsson GE radio systems? Ask the experts—your peers in the field. They'll tell you we're committed to meeting the rigorous demands of the utility environment. Our detailed Radio Communications Equipment Guide will show you the quality products and systems that are helping us keep that commitment. Call **1-800-GE-12345** for your free copy.



Mobile Communications

Ericsson GE Mobile Communications Inc.

Inquire R.S. 15

Meter program saves $42k annually

CINCINNATI—Cincinnati Gas & Electric Co.'s electric meter department is saving 300 miles of paper and several thousand phone calls annually with its new computerized Electric Meter Check-In Tag System.

When an electric meter is removed for routine maintenance, repair or replacement, the check-in tag shows the final reading and other information used by several other departments.

Under the old system, this information was transcribed into a file and printed as a book containing 900-1000 pages. Six copies were distributed to customer accounting, service records, special ledger, electric service and electric-meter departments. All other departments that needed meter information would call the electric meter department 20-30 times a day.

Each day, the previous edition—consisting of two boxes of computer paper—was discarded. That comes to 520 boxes a year, each box containing 3000 ft of paper.

The utility reports total savings of $42,000 a year. The online Electric Meter Check-In Tag Report is immediately available to anyone with access to a CICS terminal. The system reduced the use of printers, saves paper, and nearly ended telephone interruptions.

"We are already seeing 250 inquiries a day into the system," said Oscar Rummel, electric planning department. "It eliminated people waiting in line to use the listing or getting up to go see where it's stored and not finding it."

The online system uses a Database II program and has Common User Access protocol as well, Rummel added. A team of in-house personnel developed it.

HENRY STEIN, Senior Editor-Generation

Seal replacement eliminates combined-cycle plant downtime

CHICAGO—Frequent seal failures plagued boiler feedwater pumps at Puerto Rico's Aguirre Power Station on the island's southeast coast near the city of Salinas. Detailed seal analysis, redesign and retrofitting solved the problem, though.

Largest plant on island

Since it has the largest capacity of any Puerto Rico Electric Power Authority (PREPA) plant, at 600 MW, operational reliability is particularly important at Aguirre. However, Victor J. Yunque, preventive maintenance engineer, notes that achieving maximum efficiency in the combined-cycle operation was hindered by repeated mechanical seal failures in the eight primary and eight standby boiler circulator pumps. They supplied the two 100-MW steam turbines downstream of the eight 50-MW gas-fired turbines.

Yunque complains, "Every time both pumps of a steam generator went down, we would lose about 20 to 25 megawatts of generating capacity." And he adds, "To this, you have to add the cost of a two-man maintenance crew for the three days it normally took to get a pump back online."

Primary cause of seal failure was warping of the elastomer O-rings. Yunque feels the O-rings could not withstand the temperature buildup of up to 540°F inside seal chambers. O-rings with different elastomeric compositions were tried, but the failures still continued.

Says Yunque, "They also changed the size of the O-rings, but that didn't work."

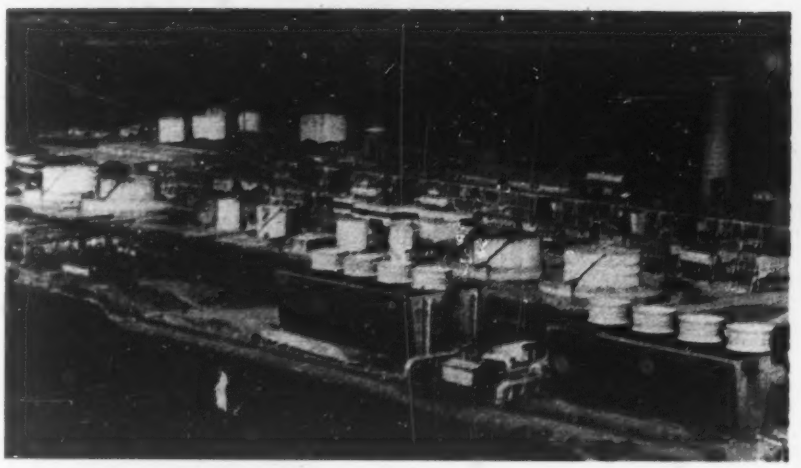
Results

First, three pumps were retrofitted with a John Crane Type 8B1 O-ring seal that can withstand temperatures of −40°F to +500°F. This stopped primary pump leakage, but not leaks from standby pumps.

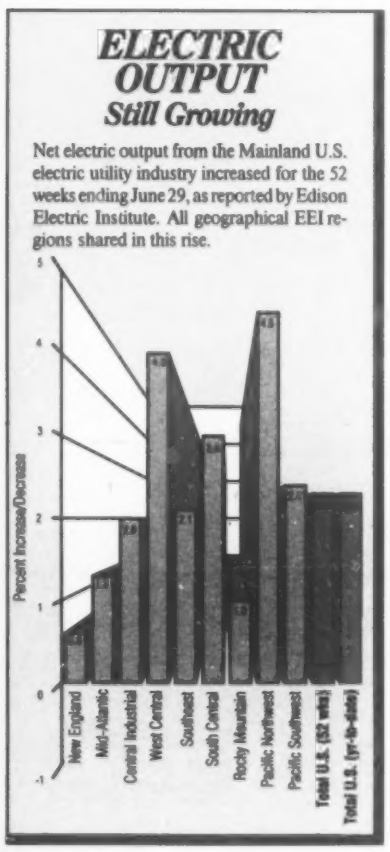
Another retrofit, with a larger-diameter seal chamber slowed the failure rate in the standbys. Crane engineers decided that water hammer was adding to the damage from the heat buildup. So they modified the final version of the seal with a washer of hard-wearing, tungsten-carbide.

Eight of the plant's pumps were retrofitted with the Type 8B1-HH seals, and technicians are installing the new seals in the remaining pumps.

The retrofitted seals halted loss of up to 25 MW of generating capacity per day caused when pumps went down and also shortened each seal's installation by 4 hr. In addition, the new elastomeric O-ring seals from John Crane Inc. lengthened seal life, which had sometimes been as short as one day since the pumps were installed in 1974—the retrofitted version has performed without failure since installation in April 1988.



The Aguirre combined-cycle plant is the Puerto Rico Power Authority's largest generating facility.



CFB proves itself in San Francisco

SAN FRANCISCO—Five circulating fluidized-bed boilers operating in the San Francisco area since 1989 and 1990 have met or exceeded contracted specs, proving out the basic concept of CFB boilers for the utility industry.

Ten of this model fluidized-bed boiler units now operate in the U.S. Each of the 10 burns solid fossil fuel, yet meets or exceeds California's strict emission standards.

The five bay-area units are the first ones in the U.S. to fire 100-percent "fluid petroleum coke", a solid-fuel byproduct of oil refinery production, according to Combustion Power Co., which makes the boilers. They burn the fuel, formerly a waste product, with 99-percent efficiency and reductions of SO_2 and NOx emissions greater than 95 percent. Other fuels the boilers can burn include petroleum coke, coal fines, high-sulfur coal, and wood waste.

Specified combustion efficiency was 98 percent; typical efficiencies have been 98-99 percent. Guaranteed SO_2 removal was 97.5 percent (or, 54 ppm at 3-percent O_2); actual has been 98-99 percent (10-45 ppm SO_2). NOx emissions were specified for 50 ppm at 3-percent O_2); they've actually been 10-35 ppm. Lastly, CO emissions were to be 120 ppm; actual emissions have been 20-100 ppm.

Typical monthly capacity factors have ranged from 75 to 102 percent.

Owned by GWF Power Systems Inc., the last of the five 20-MW units went online late in 1990, making the five of them capable of supplying a total of 100 MW to the Pacific Gas & Electric Co. electric grid.

Inside the combustion chamber of the fifth San Francisco bay-area power plant, two technicians prepare to fire the FI CIRC boiler, which will eventually reach a temperature of 1625°F.

Solid-oxide fuel cells to be made here, and tested here and abroad

BARRINGTON, IL—The solid-oxide fuel cell may be on the way to commercial reality now that the Dept. of Energy and Westinghouse Electric Corp. have begun a combined effort to speed up the cell's development.

The $140-million, five-year cooperative agreement is split, with the government funding $64 million, and Westinghouse and other sponsors providing $76 million. The DOE Morgantown Energy Technology Center will oversee the agreement.

Bigger and better

Westinghouse will test progressively larger single cells and cell bundles, to culminate in tests of two 25-KW modules, three to five 100-kW modules and a 2-MW module. The 2-MW module will be constructed of up to 10,000 individual solid-oxide cells.

The company already has fabricated 3-kW and 20-kW modules to verify that multiple cells can operate together.

"Our joint multimillion-dollar commitment with DOE is a formal acknowledgement of the increasingly favorable outlook for this technology," said Dr. Isaac R. Barpal, Westinghouse vice president, science and technology.

How they work

Solid-oxide cells generate power electrochemically, like batteries—but, more like engines than batteries, operational fuel cells can produce continuous electricity as long as fuel is provided.

In one of the Westinghouse cells, zirconia ceramics produce electricity and heat from a reaction between hydrogen-rich fuel and oxygen from the air. The cell has a tubular configuration of multiple ceramic layers bonded together. The layers contain an air electrode, a solid electrolyte and a fuel electrode. The ceramic compositon allows a cell to operate at higher temperatures (1800°F/1000°C) than other fuel cells.

The high operating temperatures provide hot exhausts needed for energy-efficient applications such as cogeneration, combined-cycle generation in electric utility plants, and useful heat for industrial processes or commercial buildings.

The cells' modular design also should allow them to be economical over a range of power ratings—to meet the needs of utility plants, cogeneration plants, and small industrial and commercial installations. Their tubular construction should lend itself to eventual factory production of modular packages.

Research, field tests

The research program at the Westinghouse Science & Technology Center in Churchill, PA, near Pittsburgh, is to focus on materials development, and cost and performance improvements. A major design goal is to develop tubes of up to 200 cm (nearly 80 in.) in length to double the current length and power output.

Then various sizes of development generators produced at the company's Monroeville, PA, plant will be operated at several utility and industrial sites in this country. In addition, two 25-kW units will be manufactured and shipped to Japan for tests at utilities

Continued on page 32

Zebra mussels now really in Hudson River

NEW YORK—It's really official now—Zebra mussels have made it into the Hudson River. Charles O'Neill of the New York Zebra Mussel Information Clearinghouse in Brockport, NY, confirmed that the mullosks found in May near Rogers Island about 20 miles north of New York City are indeed the problem-causing foreigners that apparently hitched a ride into U.S. waters aboard a foreign freighter.

O'Neill made sure several scientists carefully checked the mussels found in the waters by the island before making his announcement. A similar alarm sounded in November 1990 proved to be false (*EL&P*, 1/91, p.40).